Public Dental Service Utilisation in South Australia

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Abbreviations

ADA	Australian Dental Association
AHMAC	Australian Health Ministers' Advisory Council
AIHW	Australian Institute of Health and Welfare
ANOVA	analysis of variance
ARCPOH	Australian Research Centre for Population Oral Health
ATT	global measure of attitude
Att	belief-based measure of attitude
B	behaviour
b	outcome belief strength
β	unstandardised beta coefficient
c	control belief strength
CDHP	Commonwealth Dental Health Program
CDS	Community Dental Service
CPI	Community Periodontal Index
χ^2	Chi-square
CI	confidence interval
CoC	course of Care
DMFT	decayed, missing, filled permanent teeth
DSRU	Dental Statistics and Research Unit

e	outcome evaluation
h^2	communality
HI	higher intender
HBM	health Belief Model
INT	intention
LI	lower intender
Max	maximum
mc	motivation to comply
Min	minimum
MIS	management information system
n	sample size
NA	not applicable
nb	normative belief strength
NHMRC	National Health and Medical Research Council
ns	not significant
OR	odds ratio
P	P-value
p	power of control factor
PAL	Primary approach letter
PBC	global measure of perceived behavioural control
Pbc	belief-based measure of perceived behavioural control
PC	global measure of perceived control
Pc	belief-based measure of perceived control
PEN	predisposing, enabling and need factors
R^2	per cent variance explained
REF	reference category for odds ratio
RNI	Relative Needs Index
RSE	relative standard error
SA	South Australia
SADS	South Australian Dental Service
SCT	Social Cognitive Theory
SD	standard deviation
SE	global measure of self-efficacy
Se	belief-based measure of self-efficacy

SES	socioeconomic status
SN	global measure of subjective norm
Sn	belief-based measure of subjective norm
SRS	simple random sampling
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action

Abstract

In Australia, adults from low socioeconomic backgrounds are eligible to receive public-funded dental care. However, the severe rationing of public oral health resources has reduced the capacity of the public dental services to deliver timely and appropriate dental care. As a result, eligible adults are more likely to receive care for emergency dental problems which lacks the opportunity for more comprehensive and preventive dental care. Differential access to oral health care and differences in care for those receiving services contributes to a disproportionately higher burden of oral diseases and disorders in some segments of the population, in particular financially disadvantaged Australians and other minority groups in Australia. Inequalities in both oral health and in access to oral health services experienced by adult public dental patients are considered to be a major public health issue in Australia (National Health Strategy, 1992).

This thesis examines factors influencing the use of public-funded dental services in South Australia, particularly the use of emergency dental services among adults eligible for public-funded dental care in order to address the variance in use of services among adults eligible for public-funded dental care.

Aims: The aims of this research were to 1) investigate factors associated with the utilisation of public dental services by adults for emergency and general dental care, 2) examine longitudinal patterns of dental service use among adults eligible for public-funded dental care, and 3) measure and understand the factors which encourage and hinder dental service utilisation through examining the dental beliefs, values and attitudes of adults using public dental services and to predict dental visiting intentions and dental visiting behaviour.

Methods: For efficiency and practicability, this research drew on an existing and established sample of public dental patients recruited for the 'Relative Needs Index' study in 1999 (Spencer et al., 2002). The sample from this parent study and associated data acted as a baseline for this research.

There were three components to this research. Initial analyses for the first stage of this research were descriptive and involved describing the socio-demographic characteristics, oral health status and service characteristics of patients receiving public-funded

emergency and general dental care at baseline. In the second stage of this research, participants from the parent study were followed for up to 3½ years so as to examine longitudinal patterns of dental service use. Information pertaining to dental visits and treatment received at those visits was extracted from the EXACT management information system (MIS) in the South Australian Dental Service. Longitudinal analyses were used to establish a pattern of care seeking among the baseline sample and to subsequently identify groups of different attender types (i.e., emergency attender, general attender or emergency and general attender). Each participant in the parent study was also asked to complete a questionnaire assessing dental beliefs, values and attitudes – this formed the third stage of this research. The questionnaire was developed using the methods of the Theory of Planned Behaviour (TPB) and specifically measured intentions, attitudes, subjective norms and perceptions of behavioural control in relation to visiting the dentist. Patient clinical records were accessed via the EXACT MIS in order to determine whether or not the patient visited the dentist after returning the questionnaire. This avoided reliance on self-reported behaviour which can be subject to reporting bias. Overall, questionnaire respondents were followed for an average of 1.17 years to establish whether or not they visited the dentist after returning the questionnaire. This measure of actual dental attendance behaviour corresponded to the nature of the first course of care received post-questionnaire and was used as the dependent variable in the behaviour prediction model.

Results: ***Stage 1:*** Data collected as part of the parent study were used to describe socio-demographic characteristics, oral health status and service characteristics of patients receiving public-funded emergency dental care (n=427) and general dental care (n=471). Emergency and General dental care samples were reasonably homogenous with respect to socio-demographic characteristics with only educational attainment varying significantly between samples (Chi-square; P<0.01). Self-reported dental visiting behaviours (i.e., usual reason for visiting the dentist, time since last dental visit, place of last dental visit and frequency of dental visits) varied significantly (Chi-square; P<0.01). Oral health status data revealed that the emergency dental care sample had significantly more decayed teeth and hence unmet need than the general dental care sample, and also significantly more missing teeth than the general dental care sample (ANOVA; P<0.05). Types of services received also varied between emergency dental care and general dental care samples, with emergency patients receiving significantly more oral surgery services per course of care, but significantly less diagnostic, endodontic, restorative and general services (ANOVA; $P<0.05$).

Stage 2: Data were extracted for 413 (96.7%) and 431 (91.5%) emergency dental care patients and general dental care patients at baseline respectively. There were statistically significant differences between emergency and general baseline samples with regards to the time taken to return for treatment after baseline, the number and type of courses of care received after baseline and the average time between courses of care. Some 70.7% and 51.3% of the emergency and general baseline sample respectively returned for subsequent treatment post-baseline. Of those who returned, 72.6% of the emergency baseline sample returned within the first 12 months compared to 40.3% of the general baseline sample. The majority of the emergency baseline sample (52.4%) and general baseline sample (63.8%) who returned for a visit only presented for emergency courses of care. Across the total sample followed, the attendance behaviour (i.e., emergency attender, general attender or both) for 69.4% and 48.7% of the emergency and general baseline samples respectively could be ascertained. The remaining 30.6% of the emergency sample and 51.3% of the general sample appeared to not have returned for dental care and so were left unclassified.

Stage 3: The sample was comprised of 517 people (adjusted response rate=67.4%) aged 54.9 years (± 16.3 years) who completed questionnaires assessing their dental visiting intentions, attitudes, subjective norms and perceptions of behavioural control (self-efficacy and perceived control measures). A confirmatory factor analysis demonstrated that the constructs of the TPB achieved discriminant validity. Furthermore, the measures of attitude, subjective norm and perceived behavioural control were significantly related to their belief-based measures, supporting the concurrent validity of the measures of TPB. A linear regression model demonstrated that attitudes, subjective norms, self-efficacy and perceived control were significant predictors of dental visiting intention. Perceived control and external control factors, which included barriers to dental care such as cost and waiting lists, were found to be significant predictors of dental visiting behaviour, particularly emergency dental attendance.

Conclusions: ***Stage 1:*** Dental visiting patterns and service provision patterns vary according to the nature of a dental visit.

Stage 2: Findings from component 2 of this research provide new information on dental attendance patterns and cycles of courses of care, especially emergency courses of care, among adults accessing dental care within the public dental system, and highlight access problems to public dental care.

Stage 3: Adults using public dental services have strong positive attitudes, subjective norms and self-efficacy beliefs towards dental visiting. However, people perceive a lack of control over visiting the dentist, so efforts should be directed at eliminating the structural barriers that currently exist. Reducing external barriers to dental care will improve access to dental care for many of these adults and ultimately improve the oral health among financially disadvantaged South Australians. This study assessing dental beliefs, values and attitudes provides new information on dental attendance patterns and beliefs influencing the use of public dental services among adults eligible for public-funded dental care.

Declaration

This thesis contains no material that has been accepted for the award of any other degree or diploma in any university. To the best of the candidate's knowledge and belief, the thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

I give my consent to the thesis being made available for photocopying and loan if accepted for the award of the degree.

Signed:

Date: ....28.04.05..........................

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Baseline data for this research originated from data collected for the Relative Needs Index study. The Relative Needs Index study was developed by Professor John Spencer and Dr Kaye Roberts-Thomson and was supported by a contract from the South Australian Dental Service. The successful collection of data for the Relative Needs Index study was made possible by the efforts of many people. In particular, I acknowledge Kelly Jones for her involvement in coordinating the data collection and preparing data files, and staff of the South Australian Dental Service for their time and effort in the collection and provision of the data.

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1 Introduction

This thesis examines factors that influence the use of public-funded dental services in South Australia, particularly the use of emergency dental services among adults eligible for public-funded dental care. Use of emergency dental services is of particular interest because of the increased demand for emergency care within the public dental system and because of the long waiting lists for general care which result from this increased demand for emergency dental care (Auditor General Victoria, 2002; SADS, 2003).

The research for this thesis began with an established dataset from a study entitled 'Relative Needs Index' (RNI) conducted in 1999 (Spencer et al., 2002). The sample therefore used for this thesis was those people who were recruited for the RNI study. Within this document, the RNI study will be referred to as the baseline study.

There are three components to this thesis. The first component of this thesis involved using data collected from the baseline study to describe the socio-demographic characteristics, oral health status and service characteristics of patients receiving public-funded emergency and general dental care. The purpose of using this baseline data was primarily to establish characteristics of and service profiles for emergency and general dental care patients. The second component of this thesis involved following baseline subjects longitudinally for up to 3½ years after recruitment to the baseline study in order to obtain information pertaining to subsequent dental visits and treatment received at those visits. Longitudinal analyses were used to establish a pattern of care seeking among the baseline sample in order to identify groups of different attender types (i.e., emergency attender, general attender or emergency and general attender). The relevant information for this component of the thesis was accessed from clinical records via the EXACT management information system (MIS) installed at South Australian Dental Service (SADS) Community Dental Service (CDS) clinics. A questionnaire collecting information about patients' dental beliefs, values and attitudes and their use of public dental services was sent to baseline participants to investigate factors influencing dental attendance – this comprised the third component of this thesis. In order to develop this questionnaire, structured interviews were conducted with a similar group of adults to those in the baseline sample to find out about public dental service utilisation among adults eligible for public-funded dental care. The qualitative data generated from these interviews was used to assist in the design of the questionnaire sent to baseline participants. The development of the questionnaire was based on the theoretical framework of the Theory of Planned Behaviour (TPB), and set out to measure patients' intentions, attitudes, subjective norms and perceptions of behavioural control in relation to visiting the dentist. A measure of actual dental attendance behaviour was also collected at this stage. This measure of actual dental attendance behaviour corresponded to the nature of the first course of care received post-questionnaire. Patient clinical records were accessed via the EXACT MIS in order to obtain this information.

This chapter gives some background information concerning public dental service utilisation in Australia, a description of the problem to be investigated, an explanation of the rationale for studying the problem, and an outline of the framework and specific objectives.

1.1 Why study dental service utilisation?

Before going any further it is worthwhile to consider why it is important to study utilisation of dental services. A population's utilisation of dental services is an important parameter in oral health care planning and provides information on accessibility of dental services.

At present public dental services across Australia are not meeting the oral health needs and demands of adults eligible for public-funded dental care (Spencer, 2001). The situation of unmet dental needs among adults is compelling. Perhaps one of the most documented barriers to using dental services is access, or lack thereof, to dental care. Lack of access to preventive and restorative oral health services for the low-income population in Australia is of great concern and has reached a crisis level (Auditor General Victoria, 2002). Communities have a shared responsibility to ensure that all persons have equitable access to timely, appropriate, quality and affordable oral health care.

In past research investigating the use of dental services, the most frequently mentioned barrier to dental service use is cost. However, a number of studies have shown that the availability of free or reduced-cost services increases utilisation only slightly (Brennan et al., 1997; Kiyak, 1986; Mak, Lind and Evans, 1990). Findings such as these indicate that other factors are at play in the use (or non-use) of dental services and hence that barriers to access and prevention are complex and not simply financial. It has been proposed that other non-financial barriers to accessing dental care have their sources within the dental delivery system, patient's previous life experiences and their psychosocial background. These factors combine together to 'construct barriers, reducing the patient's ability to access dental health care' (Freeman, 1999c).

This research therefore examines these other factors that are thought to influence people's use of public dental services and attempts to determine what factors inhibit those individuals in need of oral health care from obtaining that care. Past research has identified a number of interacting factors that influence individuals' use of dental services. These factors exist within a three-level structure, with barriers to oral health care being reflected at the 1) patient/individual level, 2) provider/dental health professional level and 3) systems of care/government/societal level (Cohen, 1987). It is important that policy interventions aimed at encouraging preventive dental service use take into consideration factors that exist within this three-tier structure, as these factors in combination influence the way in which an individual uses dental services, and will ultimately determine whether or not these policy interventions are effective. Freeman (2002) remarks that the government and society need to provide an environment in which accessing dental services is easy and hassle-free. She suggests that in order to achieve this, governments need to ensure an equitable distribution of oral health services, adequate oral health care facilities and an adequate oral health labour force. In addition, Freeman recognises both the need for appropriately trained dental personnel to accommodate people's changing oral health needs and for dental personnel to be sensitive to people's attitudes and fears. She believes that if these two issues surrounding accessibility are achieved, accessibility difficulties experienced by the individual are reduced and other patient factors can be managed accordingly (Freeman, 2002).

This research will focus predominately on explaining what role, if any, individual and system level factors play in people's use of dental services. Within the framework adopted for this research, individual factors that are examined relate to dental visiting intentions, dental attitudes and perceived social pressure (i.e., subjective norms), whereas system level factors are captured through the examination of perception of control that relate to factors which may inhibit or facilitate the use of dental services.

1.2 Problem to be investigated

Having looked at why it is important to study the use of dental services, this section focuses specifically on the problem to be investigated.

Dental health impacts significantly on an individual's general health and well-being. Serious and persistent dental problems can disrupt work, daily activities and social life. In Australia, a large proportion of the population is eligible to use public dental services (approximately one-third of adults are eligible), but only a small proportion do (approximately 20%) (AHMAC, 2001). Effective access to treatment is inadequate for adult public dental patients. There are long waiting lists, and waiting times for general care and the increasing focus on emergency care indicate that public dental clinics are struggling to meet the needs of eligible adults. The insufficient provision of general care places additional pressure on clinics as they find themselves in a situation where they have to attend to a backlog of unmet dental needs in the community. The inability of public dental services to deliver dental care on a timely basis (with the exception of emergency dental care) will have a detrimental impact on the oral health of Australian cardholders.

The research problem therefore was to address the reasons why people access the public dental service for emergency dental problems and whether there are factors (at both the individual level and system level) that can be altered to change people's patterns of emergency attendance to preventive dental care attendance.

Much research has been conducted on dental service utilisation, with various models developed to explain influential factors on the decisions to seek care and the utilisation process (ter Horst and de Wit, 1993). Very little attention, however, has been given to the culture of emergency dental care seeking. Given this is an issue affecting the use of and delivery of services within the public dental sector in Australia, this study aims to develop an understanding of those factors influencing emergency dental care use. If public dental health care is to become a service that fulfils the needs of all eligible persons in an equitable manner, patterns of utilisation must be investigated and understood (Tennstedt, 1994).

There is a need to understand how much of the variation in service use is attributable to individual factors (beliefs, values and attitudes) and what role system-level factors play in explaining dental visiting behaviour of eligible adults in the public dental sector. This research tests a conceptual framework that examines the combined effects of dental visiting intentions, dental attitudes, subjective norms and perceptions of behavioural control on the dental visiting behaviour (i.e., symptomatic or asymptomatic) of users of public dental services.

1.3 Rationale for studying the problem

Disadvantaged population groups suffer from disproportionate caries burden and have greater difficulties accessing dental care, often leading to acute dental problems and inappropriate care-seeking patterns. It is thought that many of those who currently attend public dental clinics for emergency care may do so because of actual or perceived difficulty in obtaining immediate care from the general dental services. As a result it is hypothesised that they may develop cyclic emergency dental care attendance behaviours and consequently use dental services to the detriment of improving their oral health and well-being. There are few confirming data in Australia that validate anecdotal observations about adults who seek emergency public dental care for acute dental problems/pain. This study therefore will attempt to describe and relate these psychosocial risk factors in adults to the seeking of emergency dental care.

The rationale, therefore, for studying the problem was based on a gap in the literature in examining factors associated with the use of emergency dental services in Australia. There is an increasing amount of research that identifies barriers to use of services, but there are very few studies that examine and identify dental behavioural patterns and their determinants in the use of dental services, particularly emergency dental services, by disadvantaged groups in the Australian population who are dependent upon the public dental care system. Research was needed to better inform programs and policies that address the underlying behavioural determinants of dental care utilisation by financially disadvantaged adults.

In South Australia, SADS is responsible for the provision of general and emergency dental services to financially disadvantaged South Australians. However, a reduction in

Commonwealth funding for adult public dental services at the end of 1996 led to a substantial fall in the capacity of the public dental services to provide care. Eligible adults are either presenting for emergency dental care or are spending longer on waiting lists for general dental care.

Thus, understanding dental care utilisation and identifying barriers to dental care within the public sector is especially important because of limited funding in this area. Funding restrictions may make it more difficult for low income or disadvantaged populations to access much needed care. Locker (1989) has argued that treatment-seeking and utilisation behaviour are essential elements in promoting effective and efficient care. Delivery systems should to be designed with this in mind, so that care can be provided effectively and efficiently to those in need.

By studying factors that influence use of emergency dental services it will be possible to provide an explanation for variance in use of services among adults eligible for public-funded dental care. In addition, this ability to explain variation in dental service use will enable the development of effective strategies to reduce use of the emergency dental care services so aiding in the future development of policies to promote regular dental attendance for general dental care. Reducing the reliance on emergency care may break that cycle of emergency care seeking, enabling the provision of more timely and appropriate access to routine dental care whereby more preventive and basic general dental care can be offered, leading to improvements in oral health status.

Effective strategies to reduce the use of emergency dental care services, however, require generalisable information on the magnitude of the 'problem', the characteristics of individuals and their communities that are associated with emergency use, and their relative access to general dental care services. The development of policies to move people away from emergency dental care towards general dental care requires a sound understanding of the culture of emergency dental care-seeking behaviour.

Longitudinal and retrospective studies of patterns of care related to demographics, oral health status, perceived needs and attitudes would provide a more detailed analysis of access problems and inequalities in health care.

1.4 Research framework

This thesis addresses the broad hypothesis that individual characteristics and factors relating to the public dental care delivery system influence the use of dental services among adults eligible for public-funded dental care, and result in variation in such use. In addressing this hypothesis, this research examines 1) the characteristics of and service profiles of patients attending public dental clinics for emergency and general dental care, 2) longitudinal patterns of dental service use among adult public dental patients so as to identify distinct groups of attenders (i.e., emergency, general or both), and 3) dental beliefs, values and attitudes among adults eligible for public-funded dental care as potential predictors of type of dental service use.

1.5 Specific objectives

The purpose of this project was to develop an understanding of public sector dental service utilisation in South Australia, in particular among people attending dental services for emergency dental care.

The specific objectives of this research were therefore to:

1. investigate factors associated with the utilisation of public dental services by adults for emergency and general dental care;
2. describe patterns of longitudinal dental service use and explore transitions of dental care seekers from general to emergency dental care, and from emergency to general dental care;
3. measure and understand the factors which encourage and hinder dental service utilisation through examining dental beliefs, values and attitudes;
4. predict dental visiting intentions and dental visiting behaviour and explore the cognitive and affective foundation that is assumed to determine these intentions and behaviours; and
5. identify factors which may be altered so as to decrease people's propensity to cycle through emergency dental care and recommend policies to promote the efficacious use of public dental services.

2 Dental health literature

Utilisation of dental services has long been used as an indicator of oral-health-related behaviour, with many studies in the dental health arena investigating why, how and how often people use dental services in order to identify the factors which determine utilisation behaviour (Mak, Lind and Evans, 1989).

2.1 Oral health and dental service use

This section will discuss the impact oral health has on an individual's life before placing oral health in the context of dental service utilisation. As Sanders (2003) aptly points out, the dental health literature in recent years has moved away from viewing oral health as concerned solely with specific oral diseases and disorders and in clinically managing these conditions. Instead, there has been more focus on oral health from the individual's perspective through the measurement of subjective oral well-being and impact on quality of life. These aspects of oral health will be discussed in this section.

2.1.1 Importance of oral health

Oral health can be defined as '[a] standard of health of the oral and related tissues which enables an individual to eat, speak and socialise without active disease, discomfort or embarrassment and which contributes to general well being' (Fuller and Blinkhorn, 1995).

This definition of oral health recognises that oral health is more than just a physical state of well-being; oral health also encompasses a psychosocial perspective (Gilbert et al., 1998a; AHMAC, 2001). In general, oral health has been described as an outcome of various factors such as policy relating to nutrition and socioeconomic position (for example, employment status and level of education). These factors create a system of values within society and result in attitudes and behaviours towards oral health and oral health care (Downer, Gelbier and Gibbons, 1994). The dynamic relationships between an individual and their environment are therefore important considerations in the implementation of effective health care programs (Rueben, 1999).

Although dental caries and periodontal disease are somewhat preventable with appropriate dental health behaviours, these conditions continue to be prevalent in

Australia. Oral diseases are estimated to be among the most prevalent diseases in the community according to estimates produced by the Australian Burden of Disease and Injury Study (AIHW, 2000). Dental caries (tooth decay), edentulism (or total tooth loss), and periodontal disease (i.e., pockets 6 mm or more) were ranked 1st, 3rd and 5th respectively as the most prevalent health conditions in Australians in 1996 (AIHW, 2000).

Dental health can have a significant impact on people's general health and well-being, and on their quality of life (Gift and Atchison, 1995). Research has found that poor oral health can contribute to other health problems. For instance, poor dental health can indicate poor physical health and may be associated with serious conditions such as diabetes, heart disease and poor nutrition. Poor dental health can also adversely affect a person's self-esteem by hindering their comfort with or ability to speak, smile and interact socially. The result is interference with daily activities such as sleep, eating, going to work or school and engaging in social events and activities. This situation is aggravated by limited access to and utilisation of dental services.

2.1.2 Dental service utilisation: supply and demand

The general view in the literature is that dental service utilisation positively impacts on oral health status (Petersen and Holst, 1995). Dental service utilisation is often investigated in order to examine issues related to access to dental care. Access to dental services is considered to be driven simultaneously by demand and supply forces (Capilouto, 1991).

Spencer (1980) defines utilisation as 'the actual attendance by members of the public to seek attention for their perceived needs' (p311). In this sense, utilisation is the supply of services. Low service utilisation rates are one of the primary ways in which health care access problems can be measured. Although utilisation rates are important and useful indicators of access, used alone, they lack the ability to reveal all the dimensions of access when attempting to measure equity of access. In particular, they do not reveal whether people receive the services they need. Perhaps the most important access consideration is whether people have the opportunity for a good outcome, especially in situations where health care can make a difference. When those opportunities are systematically denied to groups in society because they face barriers to care, there is an access problem that needs to be addressed (Isman and Isman, 1997). Studies of patterns of care related to demographics, oral health status, perceived needs and attitudes would provide a more detailed analysis of access problems and inequalities in dental health care.

In health services research, a distinction is often made between demand for dental care and utilisation of dental services. Demand is considered to be a measure of a patient's request for dental care, whereas utilisation, as previously explained, is considered to be the receipt or non-receipt of dental care (Petersen and Holst, 1995). The impact of increasing demand for emergency treatment on the ability of public dental services to provide general dental and preventive care is a pertinent issue affecting the delivery of dental care within the public sector. The way in which the public dental system manages demand will ultimately affect access to and utilisation of dental services. It is important to understand the values patients attach to dental health and dental care, as this would enable a better understanding of how the concept of perceived need is expressed and transformed into demand for care (Stenberg, Håkansson and åkerman, 2000). A study conducted by Hirano et al., (Abstract, 2005) found that parents appeared to consider routine medical visits more important than routine dental visits, indicating perhaps that less value is attached to dental health care. However, it is unclear whether this related to treatment needs or oral health outcomes.

Schwarz (1996) analysed the changes in demand for dental care among Danish adults between 1975 and 1990 and found that from 1980 to 1990, the significant predictors for regular dental attendance shifted from mostly predisposing and need factors to mostly enabling and need factors. Gilbert et al. (2003), in examining dental need and dental care use, found that although need was a significant predictor of dental care use, predisposing and enabling characteristics remained strong predictors of dental care use even after controlling for need. It would be interesting to determine whether these findings hold true for a sample of public dental patients, and whether predisposing variables such as attitudes are influential in this population group. Patient attitudes and behaviours at public dental health clinics in the US were examined by Farner and Djavid (2004), where it was found that low-income patients did not view seeking preventive dental care as a superior need and typically waited to seek dental care until their dental condition began to impact on their daily routine. This view, combined with inadequate dental care facilities (i.e., perceived barriers to obtaining dental care) contributed to patients having a low perceived susceptibility of their dental condition, low perceived seriousness/severity of their dental condition and a low perceived benefit in taking action toward their oral health. It is believed that the non-availability of routine or preventive care at these public dental clinics perpetuates this situation (Farner S, personal communication, March 2005).

2.1.2.1 Factors influencing dental service use

Lissau, Holst and Friis-Hasche (1989) conducted a study that examined the combined effect of contextual resources (i.e., the social environment), individual resources and the delivery system on the frequency of dental service use among Danish youths. In the prediction model which integrated these factors, it was found that individual resources and structural variables relating to the delivery system had a significant effect on the number of dental visits, whereas the effects of the contextual resources in the full prediction model were subdued. However, the independent variables as a whole were able to explain 36% of the variance in frequency of dental visits. Important variables in the model included economic barriers to obtaining dental care (as perceived by individuals), the payment structure of the dental services and the subjective feeling of fear and anxiety. These factors can be considered to be mutable factors, which means that these findings offer promise in trying to understand ways to facilitate improved attendance rates.

Attempts made to better explain dental attendance behaviour and/or the factors underlying a person's decision to seek dental care have been through examining the characteristics of different groups of attender types, such as regular and irregular attenders, or by simply assessing the reasons for (non)attendance (ter Horst and de Wit, 1993). Other researchers in the field have tried to develop predictive models of dental attendance by examining the influential effect of various variables on attendance. Such models have included Anderson's Behavioural Model of Health Services Utilisation and Ajzen and Fishbein's Theory of Reasoned Action model – these models among others will be discussed in more detail in Section 2.4. In Liddell and May's (1994) study of the characteristics or (ir)regular attenders, dental anxiety emerged as a significant factor in non-attendance. In research conducted by Newman and Gift (1992), a regular pattern of preventive care was found to be more likely among those with higher levels of self-efficacy, education and income. These studies give support to internal and external factors to an individual being important considerations in not only the use of dental services but also the type of dental care sought. Woolgrove, Cumberbatch and Gelbier (1987) used the Theory of Reasoned Action (TRA) to evaluate the factors that influence regular dental attendance among individuals in their mid-teens. Among their findings were that people did perceive there to be benefits of visiting the dentist regularly. Symptomatic attenders in this study, however, placed less value on some of the perceived benefits of regular dental attendance than did regular attenders.

The literature concerning factors that influence dental service utilisation is extensive, with most studies describing how dental service use varies according to the socio-demographic characteristics of the population (Grytten, 1991). Petersen and Holst (1995) have extensively reviewed the literature on dental care utilisation from the early 1980s and 1990s and have described within their review the many factors that were found to be associated with demand for and use of dental services. Among their findings were: that in highly industrialised countries, there was an increase in the proportion of persons from all age groups who visited a dentist, with an increasing number visiting for routine dental care; those from older age groups displayed lower utilisation rates than those from younger age groups (partly due to the differences in dentate status among these groups); use of dental services was lower among disadvantaged segments of the population, with a high proportion of persons from these groups visiting symptomatically; utilisation of dental services varied by geographic location (use of dental services by those in rural areas was lower than for those in urban areas); socioeconomic status was influential on different patterns of dental service use (for example, low income was found to have a negative effect on the utilisation of dental services); non-utilisation was associated with low levels of perceived need for dental care; and regularity of dental visits was not related to actual disease experience. Glibert, Duncan and Vogel (1998) have since provided additional information from their studies to further elucidate the determinants of dental service utilisation. Dental attitudes, typical approach to dental care (i.e., problem-oriented attender or regular attender), the salience of certain perceived non-painful oral signs and symptoms, self-reported measures of need and the salience of aesthetic measures (i.e., avoided laughing or smiling, avoided talking to someone and has been embarrassed because of the appearance of their teeth, mouth or dentures) were found to be positive predictors of dental service use. In their study, clinically measured need variables were not statistically significant predictors of dental service use. Gilbert and colleagues explained that this finding indicated that disease and tissue damage as recognised and reported by the subject is more relevant to understanding incident dental care use than knowing actual disease and tissue damage as determined from a clinical examination by a dentist. This particular issue will be addressed in more detail in the following section. The findings by Gilbert and colleagues indicate that the examination of predisposing and need variables in particular is valuable in trying to understand the complexities of dental visiting and service use. It is the prospect of the usefulness of these variables that provided the impetus to further explore these domains in the context of dental service utilisation within the public dental system in South Australia.

2.1.3 Classical clinical indicators of oral health outcomes

Past dental service use behaviour is perhaps the most important predictor of future utilisation behaviour (Davies, Bailit and Holtby, 1985; Lo and Schwarz, 1998). Oral health status data can provide information on past dental service use and unmet need. For example, the number of filled teeth can be taken as an indicator of past dental service use whilst the number of decayed teeth can indicate unmet dental need. While clinical indicators such as the decayed, missing and filled teeth (DMFT) index or periodontal condition measured using the Community Periodontal Index (CPI) can give some indication of past service use (through number of filled and missing/extracted teeth) and past and present disease experience (through number of decayed, missing and filled teeth and periodontal condition), they are inadequate in fully explaining the oral health status of individuals. This is because traditional clinical indicators such as DMFT and CPI measure oral disease rather than oral health which is a multi-dimensional concept incorporating social and psychological dimensions (Chen and Hunter, 1996; Prendergast, 2001). Consequently, classical clinical indicators of oral health outcomes have only a modest modifying influence in explaining underlying disease activity. The impact of self-rated oral health, self-reported oral health and psychosocial impacts of oral health on one's oral health are more useful in identifying the sequelae and perception of oral disease. One's perception of their health status is also an important component of one's beliefs and practices in the areas of preventive health care (Kiyak, 1982).

In a longitudinal study of dental care use among dentate adults, Gilbert, Duncan and Vogel (1998b) found that self-reported measures of oral disease were more important predictors of dental care use than clinically determined measures, reinforcing that perceived problems and perceived need are more relevant to understanding dental care use than is a normative assessment of need (Gilbert et al., 1994; Heft et al., 2003). This is because patients do not just perceive their oral symptoms in physical terms but also with regard to their quality of life. As Freeman (1999a) explains, 'for some patients it is not the symptom alone but rather a combination of the psychosocial impacts together with the symptoms which provides the impetus to seek care' (p548). Tickle, Craven and Blinkhorn (1997) suggest that it is the reporting of the physical symptoms together with the psychosocial factors that provides the stimulus to access dental care. Understanding patients' perceptions and experiences of oral symptoms may provide an indication as to why some people attend routinely and others appear to attend only for an emergency visit.

Watt and Sheiham (1999) point out that socioeconomic and environmental factors are largely responsible for improvements in oral health observed over the past 30 years, and believe that if these improvements are to continue, a strategic oral health promotion approach would be required. This approach would involve addressing the underlying social, political and environmental determinants of oral health.

2.1.4 Dental service use and impact on oral health

There is modest evidence that use of services improves oral health, and as Watt and Sheiham (1999) remark, 'treatment services will never successfully tackle the underlying cause of oral disease' (p9). Use of services does, however, alter the way disease is managed, which leads to various oral health outcomes. In studies conducted by Nadanovsky and Sheiham (1994, 1995), they found that better dental treatment or preventive dental care or increased availability of dentists did not contribute significantly to an improvement in dental caries experience. In fact, dental services only explained 3% of the variation in caries levels whereas 'broad socioeconomic factors', for example fluoridated toothpastes, explained 65% of the variation in caries levels. Thus, based on these findings, dental service provision appears to have only a modest effect on the oral health status of a population.

In a study conducted by McGrath and Bedi (2001) examining the effect of dental attendance on quality of life, some useful evidence to support the benefits of regular dental care was provided but, as the authors aptly pointed out, their findings demonstrated only an association between dental attendance and quality of life. Further research involving a longitudinal design would be required to establish whether or not dental attendance improves quality of life (Prendergast, 2001).

Davenport et al. (2003) systematically reviewed the evidence for the effectiveness of routine dental checks of different recall frequencies on caries, periodontal disease, quality of life and oral cancer in adults and children and found that there was insufficient evidence to support or refute the practice of encouraging regular dental check-ups. Dental attendance patterns and variations in dental status was examined by Sheiham et al. (1985) and their results suggested that while frequent dental visits help to postpone tooth loss and maintain dental function, frequent visits did not appear to prevent the onset of further disease. Results such as these suggest that public health approaches involving 'upstream' multifactorial intervention models (for example, a model incorporating community-based interventions and healthy lifestyle and behaviour education programs) are needed to modify peoples' psychosocial context and individual behaviour in order to improve oral health. Improving oral health requires action at various points in the development of oral disease, and the extent to which interventions are appropriate depends on the community's resources, expectations and 'need' (Cane, Butler and Walker, 2003).

2.2 Inequalities in oral health in Australia

In Australia, adults from low socioeconomic backgrounds are eligible to receive public-funded dental care. However, the delivery of public dental care to disadvantaged Australians is being compromised by a relative lack of resources. The severe rationing of public oral health resources has reduced the capacity of the public dental services to deliver timely and appropriate dental care. As a result, eligible adults are more likely to receive care for emergency dental problems, resulting in lost opportunities for more comprehensive and preventive dental care. Consequently those relying on public dental services are placed at risk of deteriorating oral health outcomes. The reliance on emergency dental care and the non-availability of preventive care reinforces the very pattern of dental care that has led to the inequalities in oral health. Locker (2001) conducted a longitudinal study to examine the extent to which dental care use improved oral health and found that improvements in oral health depended upon access to comprehensive dental services (including diagnostic, preventive, and therapeutic services). This association remained constant even after controlling for other factors such as self-perceived oral health. These findings suggest that the use of dental services can be a determinant of oral health when considered in terms of both improvements in physical and psychosocial functioning.

Effective access to public dental services is therefore an issue that needs to be addressed. Long waiting lists and waiting times for general dental care and the increasing focus on emergency dental care indicate that public dental services are struggling to meet the needs of the community. Differential access to oral health care and differences in care for those receiving services contribute to a disproportionately higher burden of oral diseases and disorders in some segments of the population, in particular financially disadvantaged Australians and other minority groups. Access to oral health care and utilisation of available services are particularly important factors in trying to minimise the oral health disparities of disadvantaged populations. A detailed understanding of why and how these groups use services is required if improvements in oral health outcomes is to occur.

Separating the effect of dental service use from other factors that influence oral health can be very difficult. The relationship between dental service utilisation and oral health is complex because it is dependent upon a number of factors such as access to dental care (measured by the availability of services, the obtainability of services, and the comprehensiveness of services offered (Lewis, Fein and Mechanic, 1976)), cost of dental care, oral health status and individual characteristics. As Davenport et al. (2003) acknowledges, oral health disparities which currently exist among different population groups are a reflection of a complex interaction of modifying factors for the development and management of oral disease.

Understanding the dental care delivery system and how services are financed is important if one wants to understand the current barriers to accessing dental care. Targeted interventions that address barriers to care are needed to help establish preventive dental care patterns. In addition, understanding the dental care delivery system is critical in the design and implementation of appropriate, efficacious interventions aimed at improving oral health outcomes. This section briefly examines characteristics of the public dental care delivery system in Australia and addresses issues of service provision, financing and access.

2.2.1 Delivery framework

Dental services for adults in Australia are provided predominantly by dentists in the private sector, with a smaller percentage of dental services provided through the public dental services for eligible adults. In Australia, approximately 15% of dental services for adults are provided publicly (Spencer, 2001). Resource limitations, including a shortage of dentist supply within the public sector in Australia is putting the public dental system under stress and adversely affecting the delivery of services. Of all registered practicing dentists in Australia, 82.6% work in the private sector compared to 16.2% in the public sector (Teusner and Spencer, 2003). This uneven distribution of dentists, in respect to the potential population of users, is affecting the public dental service's capacity to provide adequate dental care to disadvantaged segments of the population.

2.2.2 Financing dental care in Australia

The cost of treating dental disease in Australia amounts to billions of dollars each year. In Australia, the cost of dental services in 2002-03 was estimated to be $4.1 billion, which accounted for almost 6% of the total health budget. Dental services differ from other health services in terms of the source of funds for the expenditure. Unlike other health care services, only a small percentage of dental services (17%) are funded through public expenditures. Individuals contributed almost 67% ($2.8 billion) of the total expenditure for dental services in 2002-03 and the remaining was funded through other sources (i.e., 16% through private health insurance and 3% through other funds). This is compared to all other health care services, in which approximately 68% of services are funded by public sources and the remaining through other sources (i.e., 20% by individuals and 12% through private health insurance and other funds) (AIHW, 2004). This lack of public dollars for dental services has resulted in an increase in individuals' out-of-pocket costs for dental services, which further limits access to dental services for low-income populations.

2.2.3 Accessing dental care

In Australia a fundamental oral health care problem is access to dental services (Spencer, 1993b). High percentages of low-income individuals and health care cardholders face direct out-of-pocket costs in the use of oral services (Spencer, 1993a). In addition, an increased demand for emergency dental care at public clinics has exacerbated delays in access to general dental care and subsequently long waiting lists for general dental care. Patients who are unable to access public dental care for basic needs end up going when a problem arises. A cycle of emergency care develops, resulting in patients receiving oral treatment that eases the immediate burden of pain, but which is not the best in terms of long-term oral health outcomes. Research has found that emergency care seekers have a higher likelihood of receiving an extraction compared to general dental care patients (AIHW DSRU, 1993).

These waiting lists in public dental services affect the type of care received by that eligible cardholder. There is empirical evidence which shows the disproportionate impact of oral health on financially disadvantaged adults and other minorities, who are the most likely to experience unmet dental care wants (AIHW DSRU, 2000).

As Guay (2004) acknowledges, inadequate access to dental care among disadvantaged groups in the population is a complex problem with no clear or simple solution. Guay, in addressing dental access problems among underprivileged populations, states that access to dental care should be considered both in terms of the availability and obtainability of dental care as well as the willingness and ability of a patient to seek the dental care they require. In this way, both factors external to the patient (such as the supply side of the dental care delivery system) and factors internal to the patient (such as perceived need for care, personal factors) are considered. Factors internal to the patient relate directly to the demand for dental care and are thought to operate independently to the availability of the dental care. The literature suggests that both the supply of dental providers and the use or demand patterns of the poor contribute to inadequate access to dental services among underprivileged populations.

2.3 Public dental care in Australia

Governments have taken a role in providing dental care to disadvantaged segments of the Australian population. Public dental clinics in particular play an important role in delivering dental services to Australian adults on low incomes.

2.3.1 Inequalities in oral health

A large proportion of the Australian population is eligible to use public dental hospitals and community dental services. Approximately one-third of Australian adults are eligible, but only a minority of them use public dental services (approximately 40% of the eligible population made their last visit to a public dental service). This could be a matter of choice or the result of resource limitations (Auditor General Victoria, 2002).

Unlike medical/general health services which are primarily funded by the Australian Government Medicare system, Australia's universal health insurance scheme, there is no universal Australian government funding for dental services. Public dental care is regarded as the responsibility of the states and territories. As such, each of the states and territories has their own policies regarding allocation of funding toward public dental care, access priorities and levels of service provision to eligible adults (Marino et al., 2002). In a budget-controlled system, the politically determined distribution of resources sets the limits for use. If there are more people demanding dental care than it is possible to supply with the present resources, then rationing of services generally occurs. This is the current situation for emergency and general dental care requests.

Traditionally, emergency dental care is offered to patients with acute dental problems that include haemorrhage, trauma and facial swelling. However, emergency dental care is also made available to patients for a broader range of dental diseases and disorders that require treatment for the 'relief of pain'. Common examples of emergency treatments are simple extractions, provision of antibiotics, pain medication, and temporary fillings. This care is expeditious and is the most austere type of care. General dental care on the other hand is intended to restore and maintain a person's overall oral fitness and is more comprehensive in terms of the type of care and services offered. The scope of services includes restorative, exodontic, minor oral surgical, periodontics, endodontics, prosthodontic, and preventive procedures.

A scarcity of resources in the public dental sector affects the demand for dental services and the capacity of public dental services to deliver much needed dental care and services to disadvantaged segments of the Australian population. As previously mentioned, dental care is the least subsidised area of health care. Less than 7% of all dental expenditure is directed to disadvantaged adults, despite nearly one-third of all Australian adults being eligible for public dental care (Spencer, 2001). As Spencer (2001) describes, dental care from public dental services is rationed by:

1. delay – this is reflected through the public dental care waiting lists, whereby an estimated ½ million adults across Australia are on waiting lists for general dental care (Australian Health Ministers' Council, 2001; Spencer, 2001). Waiting lists are the result of unlimited health demands on limited resources and represent unmet demand;

2. dilution – long waiting periods encourage adults to seek emergency dental care. As such, demand for urgent dental care has increased to the point where emergency dental care dominates the care sought at public dental services. Nearly 60% of all care from the public dental services is emergency care. This dental care, however, is not comprehensive care but merely offers a 'quick-fix' solution to those with presenting dental problems. Although no-one is turned away for emergency dental care and they are able to receive that care within a reasonable time period, the services offered are limited in scope and depth – everyone receives less and, as a result, the quality of dental care is compromised (as emergency care lacks the opportunity for more comprehensive and preventive dental care); and

3. price – patient co-payments have depressed the demand for public dental care by approximately one-third. Adults either seek dental care from the private sector (despite not really being able to afford it) or go without care. An audit of community dental services in Victoria (Auditor General Victoria, 2002) revealed that there was a reduction in acceptance rates for an offer of care from the waiting list, suggesting that access to public dental care by concession cardholders had been impeded by the introduction of co-payments.

2.3.2 Oral health of disadvantaged Australians

Oral disease is prevalent among all population subgroups but is much more pronounced among disadvantaged segments of the population. Research has found that people from low socioeconomic backgrounds are more likely to engage in unhealthy lifestyle behaviours that are associated with illness and increased morbidity (Shi, 1998; Locker, 2000; Turrell and Mathers, 2000). The association between social disadvantage and health inequalities, poorer psychosocial health and harmful health behaviours is a fundamental issue relevant to public oral health services in Australia (Cane and Butler, 2004).

Research undertaken by AIHW DSRU into the oral health and service use patterns of disadvantaged Australians has shown a significant level of inequality in oral health and in access to dental care when compared to the rest of the population. There is empirical evidence showing that disadvantaged groups within the Australian population visit the dentist less frequently, are more likely to visit for a problem or for emergency dental care when they do make a visit, are more likely to have teeth extracted rather than restored and are less likely to receive preventive dental care (AIHW DSRU, 2001).

This pattern of service use and provision is having a detrimental impact on the long-term oral health of disadvantaged persons. The oral health of these persons will continue to be on an inevitable downward spiral if this situation persists.

2.3.3 Reducing barriers to dental care

The Commonwealth Dental Health Program was introduced in January 1994 in an effort to reduce inequalities in both oral health and in access to oral health services among the Australian adult population. Three of the desired outcomes of the provision of services under this program were the promotion of general dental service use over emergency dental service use, the provision of restorations over extractions and prevention over treatment (Brennan et al., 1997; Spencer, 2001).

The program appeared to achieve some of its objectives in the two years following its introduction in Australia. There was an increased frequency of dental visits, fewer extractions and more restorations, reduced frequency of toothache and a reduction in the waiting time for a check-up. However, there was only a small shift away from the use of emergency dental services to general dental services, limiting the movement away from extractions. Problem-oriented attendance at public dental clinics was associated with higher rates of extraction and lower rates of restorations for decayed teeth compared with those ineligible for public dental care (Allister et al., 1995).

Under the CDHP, the length of waiting lists had decreased and so the Commonwealth Government abolished the program in December 1996, arguing that the program had seemingly met its objectives and was no longer needed (Lewis, 2000). With the cessation of the CDHP, financing public dental services once again became the responsibility of state and territory governments.

Despite the significant number of improvements in public dental health as a result of the CDHP, there were still limitations to the gains achieved by the CDHP. Holders of government health concession cards remained more likely to visit for a problem, to have an extraction, to perceive the need for an extraction and to experience toothache. Thus despite improved public-funded dental care for more cardholders, cardholders still remained disadvantaged in terms of their access to dental care and oral health outcomes. This is because of the way in which the program was funded – the emphasis was initially on providing funding for emergency care (funding for emergency care alone was provided in the first 6 months of the program) and then the remaining funding was split between emergency and general dental care for the duration of the program). The structure of the funding limited the movement away from emergency type treatments, such as extractions. The axing of the CDHP had immediate repercussions for cardholders. The CDHP increased public expectations of the services available. Following its withdrawal, public dental clinics continued to experience an increased level of demand for both emergency and general dental care services. However, a reduction in funding also meant a reduction in the number of services able to be provided. Because organisations gave priority to emergencies, the overwhelming demand for emergency care led to the allocation of resources to emergency care, and away from general care. Consequently, waiting lists grew by 20 per cent nationally in just over 12 months, exacerbating existing inequities even further (Ziguras and Moore, 2001).

Data released from the 1999 National Dental Telephone Survey showed that the oral health of people on low incomes declined between 1996 and 1999, the period following the cessation of the CDHP (AIHW DSRU, 2001). In that period, cardholders, when compared to the rest of the population, experienced greater social impact (i.e., cardholders experienced more toothache, reported higher levels of discomfort with their dental appearance and their avoidance of some foods increased), found it more difficult to afford dental care and had an increase in the number of teeth extracted per person (i.e., cardholders received more than twice as many extractions per person as non-cardholders).

Compared to the rest of the population, cardholders remained more disadvantaged in terms of their oral health and access to dental care (AIHW DSRU, 2001). In particular, cardholders were more likely to be edentulous, to have teeth extracted rather than filled and to experience toothache, report higher levels of discomfort about their appearance because of dental problems, and to avoid some types of food. In addition, cardholders were less likely to have made a dental visit in the last 12 months and experienced more difficulty paying for dental care.

Literature has shown that social inequalities are linked to the type, frequency, and pattern of dental service utilisation (Pavi et al., 1995). Given the high proportion of patients attending community dental service clinics for emergency dental care, it would be beneficial to understand the factors that cause people to perceive they have a need for dental treatment and also the variables that can predict their attendance patterns. Understanding a patient's behaviour when it comes to seeking dental care is an important factor in improving dental health outcomes.

Current access to dental health services for low-income earners is extremely limited, and improvement will most likely be difficult without additional Commonwealth funding (NDHA, 2001). Current funding is such that an acceptable basic minimum standard cannot be provided to the eligible population (ADA SA Branch, 2002). Although more funding toward dental care would improve access for many cardholders as the CDHP has shown, there are still other factors aside from funding that play an important role in dental service use. Reducing the cost of dental care to the individual by increased funding cannot in itself increase dental service utilisation among cardholders (Brennan et al., 1997).

2.3.4 Public dental care in South Australia

The South Australian Dental Service (SADS) is a publicly funded dental service that provides general and emergency dental care to eligible adults. Care is provided through the Adelaide Dental Hospital and a number of Community Dental Clinics throughout the metropolitan and country areas of South Australia. Holders of a current Government Centrelink card such as a Pensioner Concession Card or Health Care Card, or the dependents of a cardholder, are eligible to receive public dental care in South Australia.

Approximately 40% of the adult population in South Australia (some 440,000 people) and their adult dependents are eligible for public-funded dental care. At current funding levels, approximately 100,000 (23%) of SA's 440,000 cardholders receive public-funded dental care in a single year. In the wider community, approximately 60% of non-cardholders receive dental care in any one year (SADS, 2003). With demand for public dental services exceeding public capacity and priority assigned to emergency care, there has been a subsequent emphasis on emergency treatment rather than preventive care (Brennan et al., 1997). This is placing substantial pressure on public dental clinics as they struggle to deliver timely, efficient and effective dental services to those in need. In 2001/2002, 85% of all courses of care provided by SADS to dentate cardholders were for a dental emergency. As most services provided are emergency treatments using virtually all available resources, fewer people are being seen from the waiting list for general dental care, causing an inevitable increase in the length of existing waiting lists. An increasing proportion of people who are on a waiting list for general care tend to find that whilst waiting for care, or by the time care becomes available, their oral health deteriorates such that they end up attending for an emergency problem. This further increases the demand for emergency care within the public sector (SADS, 2003), thus creating, and contributing to, the cycle of emergency care seeking that many public dental patients get caught up in. Long public dental waiting lists for general dental care act as a barrier to ensuring that cardholders are able maintain their oral health. The reliance on emergency dental care and the non-availability of preventive dental care services is jeopardising the long-term oral health of South Australian cardholders.

Pertinent issues therefore faced by public dental services across South Australia are the increased demand for emergency dental care and the limited scope of treatment received (especially the receipt of extractions) as part of an emergency course of care, and the lack of focus on maintenance of teeth and prevention of oral disease (SADS, 2003). This, unfortunately, is a situation shared by public dental services across Australia.

2.3.5 Emergency dental service use

Little is known about the behavioural factors influencing the use of public emergency dental services in South Australia, let alone Australia. Low socioeconomic status along with non-availability of preventive dental services (because of long waiting lists) appear to underlie much of the demand for emergency dental care in South Australia (Auditor General Victoria, 2002; SADS, 2003).

Past studies of emergency dental services have mainly been quantitative surveys of emergency dental patients focusing on the basic characteristics of those attending, such as their age, sex, usual attendance pattern, and the type and duration of their presenting complaint (Dickinson and Guest, 1996; Holmes and Sutcliffe, 1993; Rhodes, 1990; Widstrom et al., 1988; Taylor and Dixon, 1981). Anderson and Thomas (2003) conducted a qualitative analysis on emergency dental patients to ascertain information about how patients perceived their dental problems, how they were affected by them and the process by which patients ended up attending emergency dental services. This study provided a conceptual basis for understanding the need for emergency services from the patient's perspective but did not delve into health beliefs, values and attitudes of patients that are considered to be influential factors in explaining health behaviours such as dental service use. Anderson (2004) also conducted another qualitative study that elicited patient expectations of emergency dental services. This study revealed that many emergency dental attenders wanted advice and reassurance as much as relief from symptoms. However, this study still did not answer some fundamental questions related to the use of emergency dental services, questions such as 'why are some patients frequent attenders of emergency dental services?' and/or 'do some patients use emergency services as their sole source of primary dental care?' (Calnan, 2004; p323). Also not examined in this study was whether or not users of emergency dental services had different expectations from those attending general dental services for maintenance and preventive dental care (Calnan, 2004). A recent study conducted by McNeil et al., (2002) at West Virginia University School of Dentistry examined dental beliefs in emergency dental patients. It was found that dental beliefs were more negative in emergency dental patients compared to those who sought routine care. The authors indicated, however, that further research was required to address the role these beliefs had in dental avoidance subsequent to emergency care.

This research will therefore explore the relative importance of beliefs, values and attitudes so as to develop an understanding of the role they play in the use of public dental services, in particular the use of emergency dental services in South Australia.

2.4 Behavioural models in health-care services research

2.4.1 Introduction

In trying to understand the basis of dental service utilisation, researchers have gathered together a range of factors and constructs which have been shown at one time or another to be relevant. Our knowledge and understanding of dental service utilisation is encapsulated across a number of different health behaviour models and empirical investigations of dental service use (Grembowski, 1989). Aside from illness, there are a multitude of factors that have an influence on the use of health services. Figure 2.1 illustrates the various influential factors on health-care services use, and highlights that dental service use is a complex and multifaceted phenomenon.

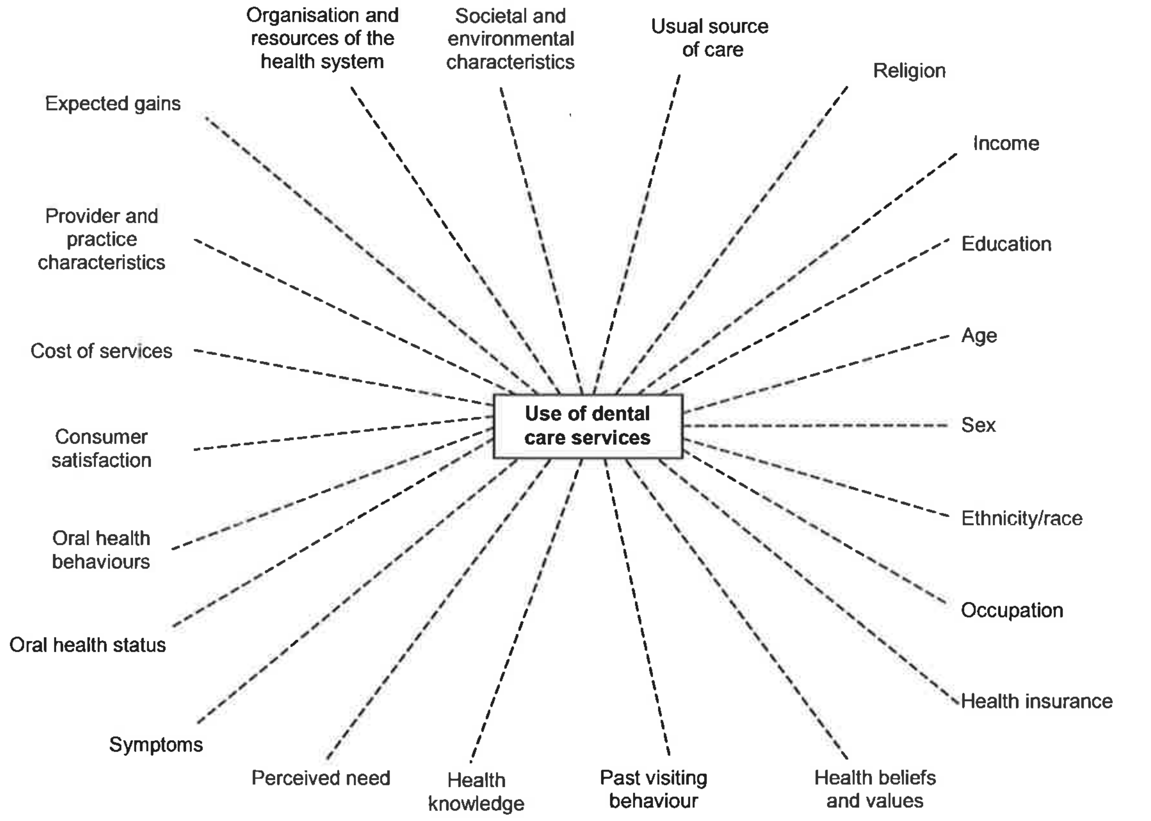


Figure 2.1: Factors posited to influence utilisation of health care services

In the last few decades the use of models in the research on use of health-care services has been growing. By using models, attempts have been made to organise the many different determining factors into a unified approach. The following section will discuss the various models developed for studying the use of health-care services. Because of the extensive literature on health services use and the multitude of related determining factors, this description is an overview. Attempts have been made to describe the most frequently applied models in health services research.

2.4.2 Health-care services research

McKinlay (1972) in his review of the literature on use of health-care services described the different perspectives from which explanations for variance in use of services can be investigated. McKinlay identified six groups of factors that can be used to examine differences in the use of health-care services. These factors, which are considered to be important in seeking dental care and medical care, are

1. socio-demographic factors: primarily factors such as age, sex, education, religion, ethnicity and socioeconomic status (SES) are examined here;
2. economic factors: factors such as income, insurance, cost/price of services and availability of medical care are examined here;
3. socio-psychological factors: these factors often focus on the decision-making process of the patient in the case of symptoms. Factors like knowledge of diseases, the perceived threat of illness (motivation), perception and learning, and also the support of social networks are part of this research;
4. socio-cultural factors: here illness-behaviour is a result of the cultural background of the patient. Family-structure, values, beliefs and social networks are important factors in this field;
5. geographical factors: factors such as proximity of services and travel time to health care facilities can be studied here; and
6. organisational factors: use of services is closely related to the quantity and quality of services offered, and also to accessibility for different kinds of people needing care. Here research is focused on communication, bureaucracy/type of delivery system, the relationship between patient and provider, practitioner ratios and the possibilities of the patient to obtain the required services.

As mentioned earlier, models depicting use of health-care services have been developed to organise the many different determining factors into a unified approach. Various models used in health-care services research are discussed in the following section.

2.4.3 Models used in health-care services research

Influential models developed in this field that have also been applied to dental health services use include the Health Belief Model (HBM) (Rosenstock, 1966), the Behavioural Model of Health Services Utilisation (i.e., Andersen's PEN (predisposing, enabling, need) model of health services use (Andersen, 1968, 1995; Andersen and Newman, 1973), Social Cognitive Theory (Bandura, 1977), a public health model of the dental care process (Grembowski, Andersen and Chen, 1989), the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and the Transtheoretical Model (Stages of Change) (Prochaska and DiClemente, 1992).

These models, which will be discussed in more detail shortly, have been used to better understand dental service utilisation within the context of behaviour change and oral health promotion.

2.4.3.1 Health Belief Model

The Health Belief Model (HBM) was one of the first models which adapted theories from the behavioural sciences to examine health-related behaviours. This model was originally developed by social psychologists Godfrey Hochbaum, Irwin Rosenstock and Stephen Kegels working in the public health arena in the 1950s to help explain why people would or would not use available preventive services (e.g., screening tests and/or vaccinations). These researchers studied the motivation of people to use available health services and discovered that an individual's perceived risk of disease and perceived benefits of action were crucial factors in their motivation.

Thus, the HBM comprises two basic components: (1) the perception of a threat, and (2) the evaluation of a recommended behaviour. According to the HBM, an individual's state of readiness to take action for a health condition is influenced by five factors:

1. **Perceived susceptibility** to the condition – one's subjective perception of the risk of contracting the condition (i.e., the perceived likelihood of developing the condition);
2. **Perceived severity** of the condition – a person's opinion of how serious this condition is, defined either in terms of physical harm or interference with social functioning;

3. **Perceived benefits** – beliefs associated with the effectiveness of actions to reduce the level of threat or vulnerability to the condition;
4. **Perceived barriers** – beliefs regarding the potential negative physical, psychological and financial impact of the condition; and
5. **Cues to action** – refer to general health motivations triggering appropriate health behaviour, and include internal cues, e.g., symptoms and external cues, e.g., interpersonal interaction (social influence) and mass media communication.

Thus, an individual's decision to use health services stems from a perceived threat of a disease, which comes from their perceived susceptibility to the disease and the potential severity of the disease. The desire to avoid or reduce the negative consequences of the disease provides them with the motivation to use health-care services. Basically, the seeking of help for a health condition is influenced by the evaluation of potential barriers (see Figure 2.2). Psychosocial factors therefore form the basis of the HBM. The HBM model is an evaluation of the decision-making process of the use of health-care services.

The model has undergone some modifications since its original formulation. In 1988, the concept of self-efficacy was added in order to better meet the challenges of changing unhealthy habitual behaviours. Self-efficacy, a concept originally developed by Albert Bandura in social cognitive theory (social learning theory) (Bandura, 1977), is simply a person's confidence in their ability to successfully perform an action (Rosenstock, Strecher and Becker, 1988). Self-efficacy is influenced by modifying variables (demographic, socio-psychological and structural variables) and in turn influences expectations (Redding et al., 2000). Self-efficacy therefore plays a decisive role in relation to health behaviour.

There are, however, two main weaknesses of the HBM. First, health beliefs compete with an individual's other beliefs and attitudes (outside of those described in modifying factors in Figure 2.2) that can also influence behaviour. Secondly, in decades of research in the social psychology of behavioural change, it has not been shown that belief formation always precedes behavioural change. In fact, the formation of a belief may actually follow a behaviour change.

Also the HBM stresses personal responsibility where people can choose to pursue behaviours that are needed for their health. As such, economic and environmental factors are not addressed within the HBM, since these may be out of an individual's control. The

HBM runs the risk of missing key sources of influence and of blaming the victim. Health problems are often more complex or may be caused by factors over which an individual has less personal control (e.g., economic or environmental factors).

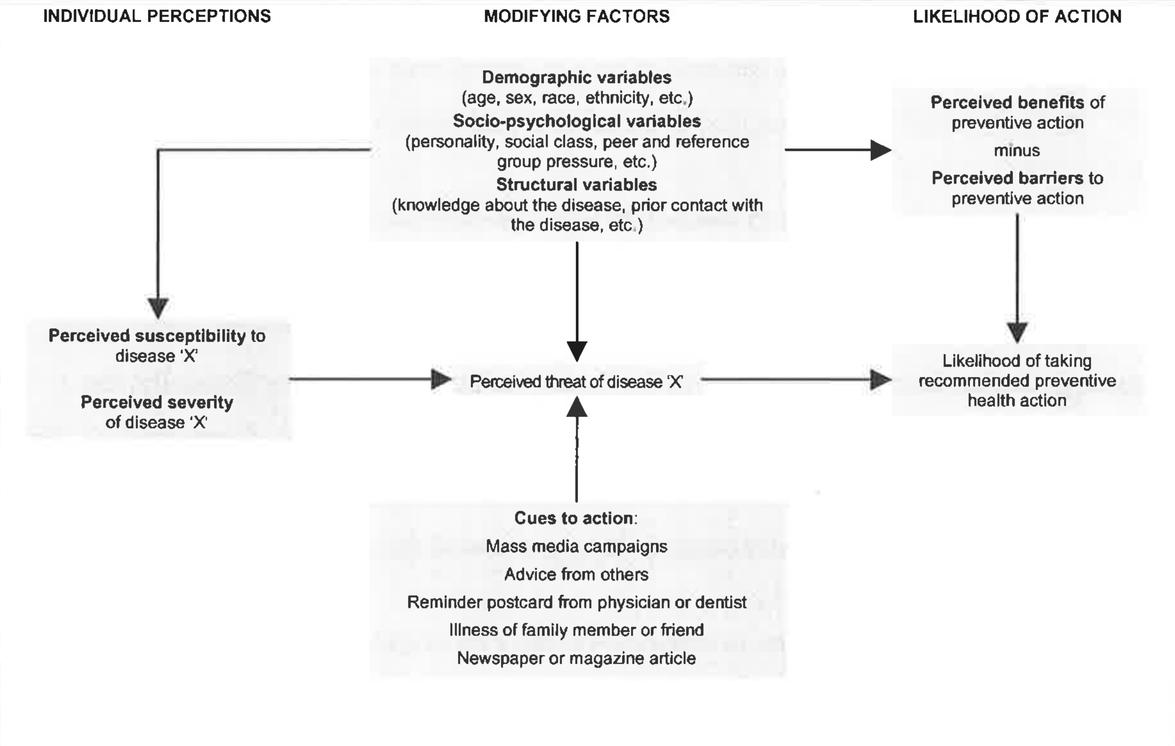


Figure 2.2: The Health Belief Model (HBM)

2.4.3.2 Behavioural Model of Health Services Utilisation

Andersen's Behavioural Model of Health Services Utilisation is often used in research into the use of health-care services. It represents a multi-disciplinary attempt to bring together economic, health-related, socio-cultural and psychological factors. In this model three different categories of variables influencing the use of health-care services are distinguished: predisposing, enabling and need factors (PEN). These factors are described as followed:

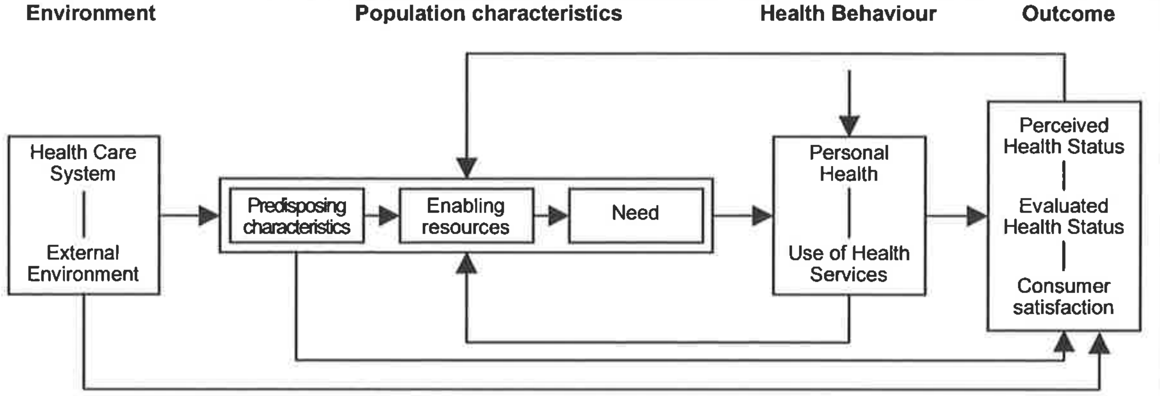
1. **Predisposing factors** – factors that exist prior to the onset of illness, and can be either mutable or immutable. Mutable characteristics are those that can be altered; for example, health beliefs and attitudes are mutable. Health beliefs and attitudes relate to the propensity of an individual to use services (such as levels of fear and anxiety, perceived importance of oral health and motivation to access care). Immutable characteristics are those that cannot be altered through policy

interventions and include demographic factors such as age, sex, race/ethnicity, education and occupation.

2. **Enabling factors** – factors that affect an individual's ability to access and use health services (such as income level, dental insurance and usual or regular source of care).
3. **Need factors** – factors specifically related to the illness and consisting of both individual perceived need for dental care and a normative assessment of need.

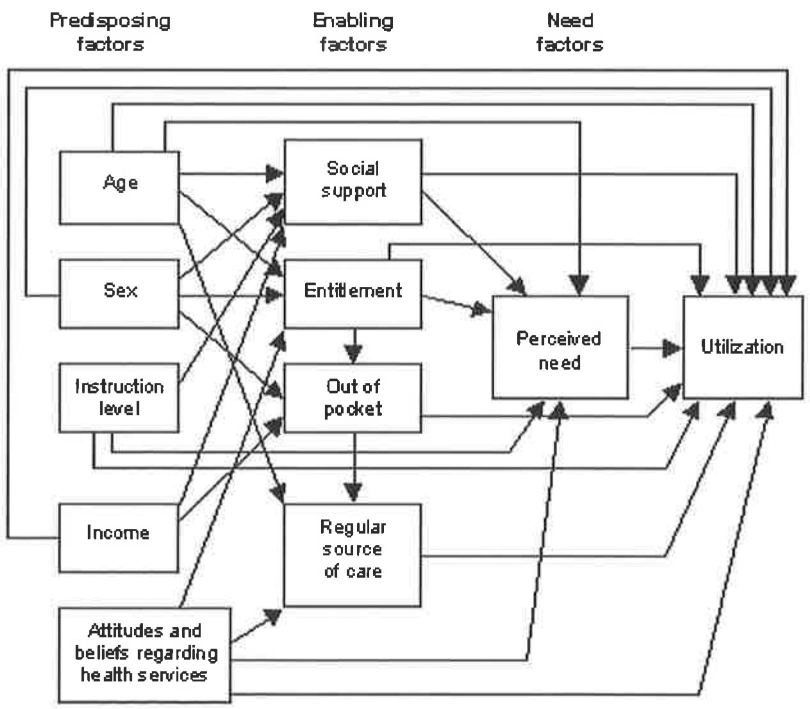
Initially, PEN factors formed the core of Andersen's model where the relationships between these factors were described using linear regression models. However, over the years, the Behavioural Model has undergone various modifications to address criticisms in its deficiencies to explain the dynamics and interrelationships between other factors aside from PEN factors. The final model to emerge is presented in Figure 2.3. It posits that a person's use of dental health services is influenced by four major categories. The first category, the environment, encompasses factors related to the external environment and health-care systems. The second category, population characteristics, covers individual determinants such as predisposing, enabling and need factors. The third category is the health behaviours themselves and includes personal health practices and use of health services, and the fourth category, outcomes, includes perceived and evaluated health status and consumer satisfaction. This model is characterised as a prediction model in that it can predict levels of utilisation through a description of patterns (i.e., it categorises factors that could affect the decision to use health-care services in the future) but unlike the HBM or Grembowski's model of the dental care process, it cannot explain why the process occurs.

Nonetheless, the Behavioural Model depicted in Figure 2.3 indicates how the multitude of factors influencing the use of health-care services can be organised. The dynamic and ever-changing nature of the relationship between service use and health outcomes over time is characterised in this model by a number of reciprocal causation or feedback loops (see Figure 2.4) (Baris et al., 2000). However, the interrelationships between factors are so complicated that a model like this can still not be used for a more exact and more mathematical approach to unravel the differences in use of health-care services. Nevertheless, it is widely used in health services research as a good basis for further studies and further development of more detailed models (van Enk, 2002).



Source: Andersen RM. Revisiting the Behavioural Model and Access to Medical Care: Does it Matter? Journal of Health and Social Behavior 1995; Vol 36 (March): 1-10

Figure 2.3: Andersen Behavioural Model



Source: Baris E, Sanchez S, de Vasconcellos M, Balassiano M, 2000

Figure 2.4: PEN factors directly and indirectly influencing service use

2.4.3.3 Social Cognitive Theory

Social Cognitive Theory (SCT) originated from the Social Learning Theory (SLT), and was introduced in 1986 by Albert Bandura, a renowned cognitive psychologist/social-learning theorist. Social cognitive theory (SCT) considers the role of personal factors (e.g., beliefs, attitudes, expectations, memory) in addition to the environmental and behavioural aspects of learning. As such, the theory suggests that behaviour is determined by reciprocal interactions among environmental factors, behaviour and personal characteristics (see Figure 2.5).

According to the theory, people tend to engage in behaviours they are confident they can perform and that produce desired consequences. Within the theory, confidence and consequences are represented by the constructs of self-efficacy and outcome expectancy respectively (Bandura, 1986). Self-efficacy is defined as the confidence people have in their abilities to achieve a specified level of achievement in a particular context (Bandura, 1986, 1997) and outcome expectancy is a judgment that a behaviour will result in one or more consequences (Bandura, 1986). These consequences or outcomes are classified as physical, social, or self-evaluative (Bandura, 1986, 2001). Self-efficacy affects outcome expectancy in that people who are more efficacious tend to envision positive rather negative outcomes.

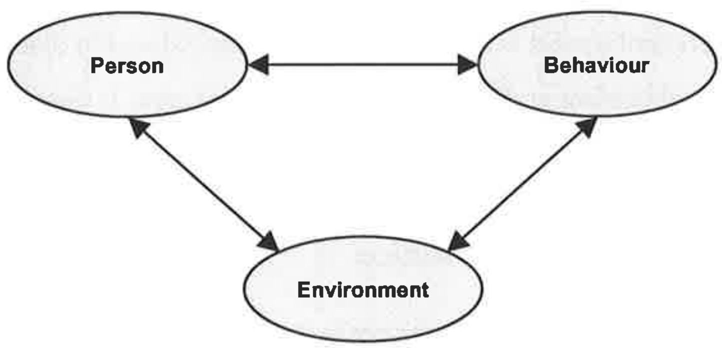


Figure 2.5: **Social Cognitive Theory (SCT)**

2.4.3.4 A public health model of the dental care process

Through an extensive review of the literature, Grembowski et al. (1989) developed a conceptual model for the use of dental care services. It consists of two components,

1. the process of accessing care, and
2. the episode of care.

The decision and process of seeking care is based on an individual's expected rewards and costs of obtaining care. The probability of beginning an episode of care results from the balance of these rewards and costs, influenced by the following four factors:

1. **structure** – i.e., social class, socio-demographic characteristics, insurance and environment;
2. **history** – i.e., usual source of care, preventive behaviours, quality of care and oral health;
3. **cognition** – i.e., dental knowledge, dental satisfaction, salience of dental care and perceived norms; and
4. **expectations** – i.e., rewards and costs.

These four factors categorise the many barriers to using dental services. Once the decision to visit the dentist has been made and an episode of care has commenced, other factors come into play. The episode of dental care itself has been described by Grembowski (1989) as a social exchange where 'the exchange relation between dentist and patient becomes the unit of analysis' (p463). This social exchange is characterised by structural factors (patient, provider and environmental factors) that shape the balance of rewards and costs, and the balance of power between the patient and the dentist.

Grembowski's theoretical model is complex and contains extensive discussion of all the mediating factors to obtaining and finishing an episode of care. It describes the decision to use dental services as a pathway or process.

2.4.3.5 The Theory of Reasoned Action

Martin Fishbein and Icek Ajzen have long worked with a simple, generalisable approach that has had great success in the area of predicting and explaining health-related behaviours. Known as the Theory of Reasoned Action (TRA), their theory posits that the best predictor of behaviour is a person's intention to perform or not to perform a behaviour. The intention to perform the behaviour is determined by 1) an individual's attitude toward performing the behaviour and 2) the individual's subjective norms about the behaviour.

Underlying attitudes and subjective norms are sets of beliefs. Attitudes are shaped by beliefs about the likely outcomes of the behaviour and the evaluation of these outcomes (behavioural beliefs), while subjective norms are shaped by beliefs about the normative expectation of others and motivation to comply with these expectations (normative beliefs). Attitudes represent overall positive or negative evaluations of the behaviour by the individual, while subjective norm assesses the perceived social pressure from specific others to perform or not to perform the behaviour. As Ajzen and Fishbein describe, 'the ultimate determinants of any behaviour are the behavioural beliefs concerning its consequences and normative beliefs concerning the prescriptions of relevant others' (Ajzen and Fishbein, 1980; p239).

Attempts to explain behaviour have typically relied on external variables such as demographic variables, attitudes toward people or institutions or personality traits. However, Ajzen and Fishbein do not attempt to explain behaviour by referring to these variables. They do not deny that these external variables can be related to behaviour, but they take on the point of view that external variables affect behaviour only indirectly. They state that 'external variables will be related to behaviour only if they are related to one or more of the variables specified by our theory' (Ajzen and Fishbein, 1980; p82). Further to this, they explain that 'External variables are at best indirectly related to any given behaviour. It is possible to devise many different explanations to account for an observed relation between an external variable and a given behaviour. Some explanations posit a direct causal effect of the external variable on the behaviour...Other explanations assume one or more intervening steps...If the relation between external variables and behaviour is inconsistent over time, additional explanations are required. Since investigations have invoked many different external variables to explain various behaviours, the number of possible explanations linking external variables and behaviour is virtually limitless. In contrast the theory of reasoned action proposes a single set of constructs that accounts for any observed relations between external variables and behaviour' (Ajzen and Fishbein, 1980; pp96-97). This being the case, Figure 2.1 becomes much more manageable.

2.4.3.6 Theory of Planned Behaviour

The Theory of Planned Behaviour was developed by Ajzen (1985, 1991) to predict and explain behaviours not under complete volitional control and is a development (an extension) of the Theory of Reasoned Action (Ajzen and Fishbein, 1980). Unlike the TRA, which is used to explain behaviours under complete volitional control, the TPB incorporates the concept of perceived behavioural control as an additional predictor of behaviour. Perceived behavioural control is thought to influence behaviour both directly and indirectly through behavioural intentions.

Perceived behavioural control represents an individual's perception of the extent to which performance of the behaviour is within their control, i.e., the perceived ease or difficulty of performing the behaviour. Underlying perceived behavioural control are beliefs about the presence of factors that may facilitate or hinder the performance of the behaviour and the perceived power of these factors (control beliefs).

Because the TPB explains behaviours that are not under the complete control of an individual, it has been chosen as the theoretical framework to explain dental visiting within the public dental service. This model and its application to dental service use and visiting is explained in more detail in Section 5.

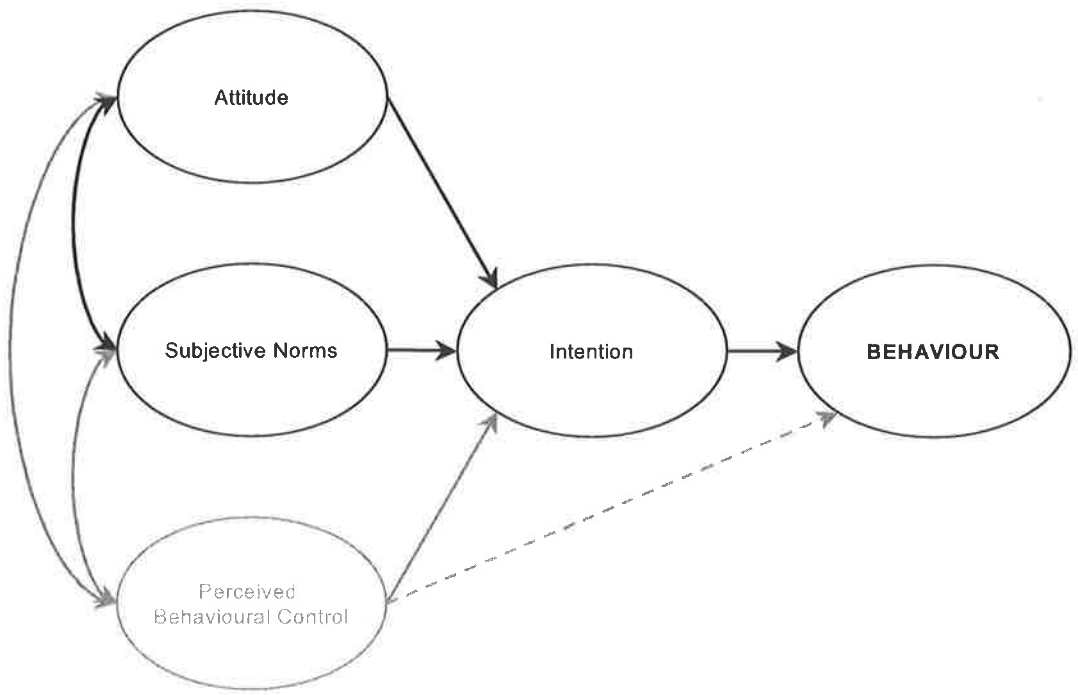


Figure 2.6: Theory of Reasoned action and Theory of planned behaviour

2.4.3.7 The Transtheoretical Model (Stages of Change)

The Transtheoretical Model of change was developed in 1979 by James Prochaska and Carlo DiClemente in order to explain how people change their behaviour. According to their model, behaviour change unfolds through a series of stages over time. That is, in adopting healthy behaviours or eliminating unhealthy ones, people progress through five levels related to their readiness to change - precontemplation, contemplation, preparation, action, and maintenance. The stages of change in this model operate along a continuum in accordance with the decision-making process that is required to achieve behaviour change. As such, an individual can move forward and backward/back and forth along the continuum (see Figure 2.7). These stages of changed are described as follows:

1. **Precontemplation** - is the stage at which there is no intention to change behaviour in the near future. Many individuals in this stage are unaware of their problems or may not be fully aware of the extent of their problem and that there is a need to change their behaviour.

2. **Contemplation** - is the stage in which people are aware that a problem exists and are now deciding whether or not there is a need to take action to resolve the problem. At this stage they have made no commitment to take action but are at the very least open to information and feedback about their problematic behaviour. In this way they have moved one step forward from those in the *Precontemplation* stage.

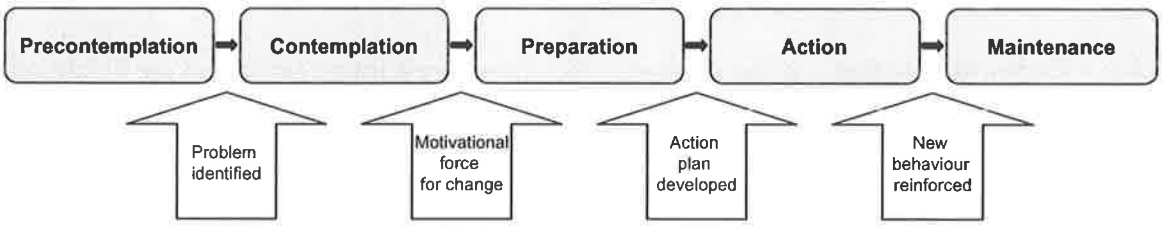
3. **Preparation** - is the stage an individual enters into once they have decided to take action - this stage combines intention and behavioural criteria. In this stage an individual is committed to taking action to resolve their problematic behaviour reasonably soon and are in the process of developing a 'plan of action'.

4. **Action** - is the stage in which individuals put their plans into action in order to alter their problematic behaviour.

5. **Maintenance** - is the stage in which an individual has changed their behaviour and is now working to sustain their modified behaviours. The self-efficacy of the individual in this stage is especially important, and is particularly at its highest,

especially when compared to the four preceding stages. Individuals in this stage are often faced with preventing relapse back to an earlier stage, but focusing on the many benefits of and gains from the behaviour change may help to combat relapse during this stage.

The Transtheoretical Model is considered to be a model of intentional change. It focuses on the decision-making process of the individual. Unlike other approaches to health promotion that have focused primarily on social influences on behaviour or on biological influences on behaviour, the Transtheoretical Model views these as external influences impacting through the individual.



Source: Scholl, 2002

Figure 2.7: **The Transtheortical Model (Stages of Change)**

2.4.4 Explanatory model of oral health status

Oral health (or oral disease) outcomes can either be causes or consequences of dental care use (Gilbert, Duncan and Vogel, 1998b). As observed in the various models used in health services research, the use of dental services is itself an outcome of a multifactorial decision-making process in which many factors affect an individual's eventual choice of whether to use the dental service and for what purpose. Spencer (2001), in explaining the 'preventability' of oral diseases, describes that there is a complex interplay between preventive behaviours and social and cultural circumstances that constrain individual decisions and determine and stabilise behaviours. Social and cultural circumstances may hold individuals in patterns of behaviour that put them at risk.

Patterns of oral health and disease indicate that personal and behavioural factors impact on dental health outcomes, and that particular populations are more susceptible to poor oral health status (Australian Health Ministers' Conference, 2001). According to Chen's conceptual model explaining oral health status in disadvantaged populations, health beliefs, values and attitudes and behaviour, which are embedded within the oral health system and social and environmental contexts, are influential factors on oral health (Chen, 1995). According to this model, health beliefs, values and attitudes indirectly affect oral health status (see Figure 2.8).

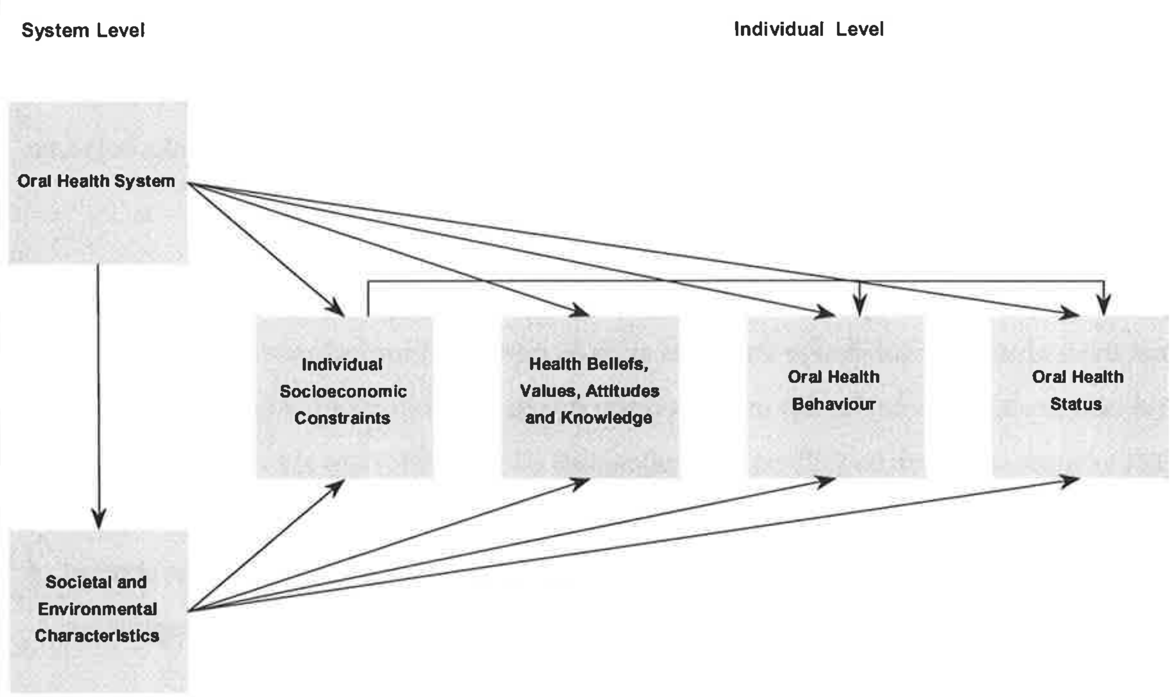


Figure 2.8: Chen's (1995) conceptual model explaining oral health status of disadvantaged populations

Chen makes an interesting point when she remarks on the inadequacies in the literature examining factors explaining the oral health status of disadvantaged populations. She notes that there is an 'overreliance on individual-level factors and lack of emphasis on system-level factors' (p189). In fact, she goes on to say,

'Most studies conclude that individual-level variables directly or indirectly determine the lower oral health status of disadvantaged populations. These studies largely ignore the impact of system-level variables. Emphasising the importance of individual-level variables (e.g., such as a disadvantaged group's health beliefs, attitudes, perceptions, values and oral health behaviours) without placing these variables in the larger context of the oral health system and socio-environment is an approach that tends to blame the individual. This approach fails to take a comprehensive and ecological view of the complex factors influencing oral health and, as a result, provides only a partial understanding of the explanations for the poor health status of disadvantage groups.'

The Theory of Planned Behaviour therefore appears to be an appropriate model to explore the dental health beliefs, values and attitudes and consequently behaviour of disadvantaged individuals, as both individual-level factors and system-level factors will be examined to develop a better understanding of the dental behaviour of individuals within the study sample. The TPB enables the relative importance of beliefs, values and attitudes in shaping oral health outcomes to be examined and will situate them more definitively within Chen's model, which currently fails to make any direct links between health beliefs, values and knowledge and oral health behaviour.

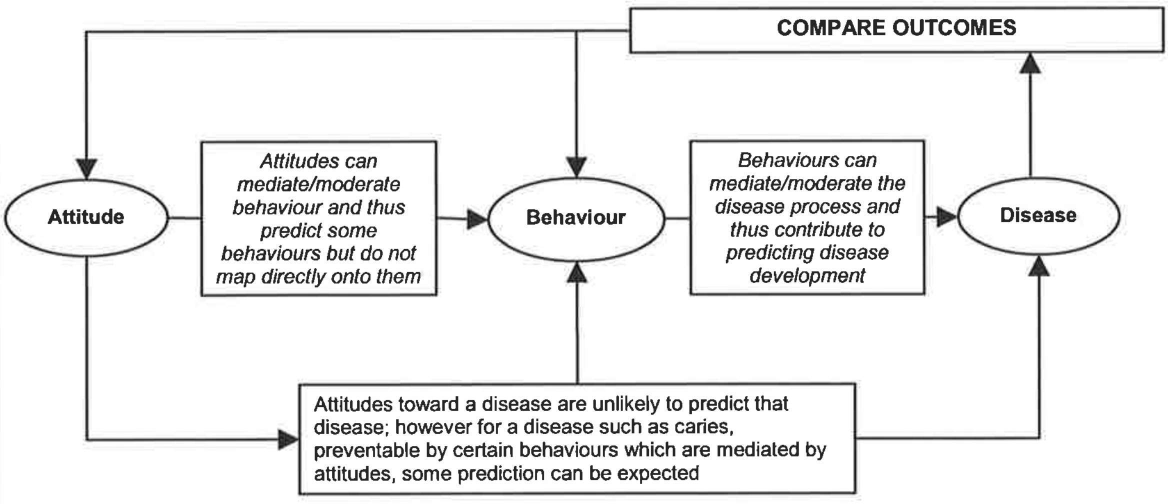
Kiyak (1986) in studying dental utilisation behaviour among elderly populations found that the inclusion of subjective variables such as perceived importance of dental health and beliefs about dental health improved the predictive ability of the behavioural models. Furthermore, research by Gilbert and colleagues (1997, 1998b) has shown that attitudes toward dental care are important considerations when trying to understand dental service use behaviour and that their influence should be better understood within the context of care-seeking behaviour. Gilbert et al. (1997) says that attitudes 'serve as surrogates for underlying characteristics that are more directly related to use' (p256).

Pine et al. (2004), in developing explanatory models of health inequalities in childhood dental caries, used an explanatory working model describing the relationship between attitudes, behaviour and disease. She explained that 'beliefs and attitudes about a particular behaviour can predict those behaviours. Although these do not map onto the behaviours entirely, the strength and direction of beliefs/attitudes can be used to predict related behaviours' (p90) and that 'cognitive representations of disease relate to health behaviour and health outcomes' (p90). This model is depicted in Figure 2.9.

Since research has shown personal attitudes to be an important factor in both dental care use and oral health, this thesis will explore the dental attitudes of adults attending public dental services in order to better understand patterns of dental attendance. Tennstedt (1994) states that a 'better understanding of dental use patterns, rather than merely rates – i.e., who uses what types of dental care and why – can be used to change delivery service mechanisms in ways that will facilitate and encourage appropriate dental service use' (p211).

Current health promotion strategies are focused on the adoption of healthy patterns of behaviours conducive to improving and maintaining health. The success of health promotion strategies depends very much on how they are implemented and to whom they are directed. Strategies that have been based on changing health-care policy have had more success than those that have only been directed towards individuals changing their health behaviours. The lack of success with the latter strategies has been attributed to an insufficient understanding of the impact of psychosocial factors and system factors on health behaviours (Freeman, 1999b).

By focusing on the characteristics of individuals that predict dental utilisation, there may be a tendency to blame the individual for their own oral health. Rather, we should also focus on the institutional barriers to the improvement of oral health among adults (i.e., a multifactorial approach to what is recognised as a multifactorial problem). The examination of the development of dental health attitudes, beliefs and values and behaviours as a consequence of individual factors and system/societal factors should be emphasised.



Source: Pine et al. 2004

Figure 2.9: **Model describing the relationship between attitudes, behaviour and disease**

3 Baseline study

3.1 Introduction

This research used baseline data from the Relative Needs Index study (RNI), a multisite, prospective study of treatment needs amongst adults eligible for public-funded dental care.

This chapter provides baseline data from the RNI study to describe the socio-demographic characteristics, oral health status and service characteristics of patients receiving public-funded emergency and general dental care. Factors associated with the receipt of emergency and general dental care are also examined.

3.2 Background

The RNI study was designed in response to the reduction in Commonwealth funding for adult public dental services as a result of the cessation of the Commonwealth Dental Health Program (CDHP) in 1997. The abolition of this program led to a substantial fall in the capacity of public dental services to provide dental care for eligible persons. As a consequence, waiting lists and time for general dental care lengthened and increased proportions of eligible persons demanded and obtained emergency dental care (Spencer, 2001).

The increased demand for emergency dental treatment and long waiting lists for general dental care necessitated the development of a system of prioritisation for emergency and general dental care within the public dental system. At the time the baseline study was conducted, there were no tested criteria or protocols to assign priority for dental care among people who sought emergency or general dental care. The baseline study sought to develop a tested system that would assess the reasonableness of presentation for emergency care and the relative need of eligible people seeking to go on the waiting list. This was done by assessing both patient perceived need and a normative assessment of need. 'Emergency' in this context had no formal or documented definition. Instead, it was defined operationally, usually by reception staff, as people who were eligible for public sector care contacting a dental clinic seeking an appointment for a specific problem, usually involving the relief of pain. General dental care, on the other hand, referred to requests for routine dental care (i.e., a check-up or dental care not considered to be an emergency) by eligible adults.

The RNI study was done in collaboration with the South Australian Dental Service. The baseline data were collected between June 1999 and October 2000, when questionnaires were administered, clinical examinations were conducted and treatment was provided (ARCPOH, 2002).

3.3 Aim

The aim of the first component of this research was to:

1. develop profiles of emergency and general dental care seekers by describing the socio-demographic characteristics, dental visiting behaviours, oral health status and service characteristics of patients receiving public-funded emergency and general dental care.

In addressing this aim, the following questions will be answered:

1. What are the characteristics of patients receiving public-funded emergency and general dental care?
2. What types of services are provided to emergency and general dental care patients?
3. What sorts of factors are associated with emergency dental care attendance and the receipt of extractions?

The baseline data used to answer the questions posed above included patient characteristics, patients' self-reported dental visiting behaviours, clinically determined oral health status, dental visit details and services received.

3.4 Methodology

3.4.1 Sampling

The baseline sample consisted of a prospective, random sample of eligible adults presenting to eleven public dental clinics in South Australia for emergency and general dental care. Participants were informed of the study at the time they contacted the clinic for either emergency or general dental care. Emergency patients were asked to participate prior to their attendance in the clinic. General dental care patients were asked to participate at the time that they were placed on the waiting list. Patients who consented to participate in the study were fast-tracked through either their emergency or general treatment so there was no lag-time bias in which their dental conditions could change. This was particularly beneficial for general dental care participants, as participation in the study meant they were able to avoid the long wait on existing waiting lists for routine care and were subsequently offered care within a month of being recruited into the baseline study. The criteria used to select emergency and general dental care patients for the study are shown in Table 3.1. For patients who sought emergency dental care, the criteria used to select participants were that patients were indeed seeking emergency dental care (requests for emergency dental care were made either in person at the participating public dental clinic or by telephone whereby the patient indicated that they required dental care for the relief of pain or a dental problem), that they held a current government health concession card, were aged 18 years or more and were dentate with six or more teeth. For the general dental care sample, in addition to being a holder of a government concession card, being aged 18 years or more and having six or more natural teeth, general dental care patients were selected based on a request to be placed on the waiting list for routine dental care, provided that they were not already on a waiting list and/or they had not visited a private or public dentist for routine dental care in the previous 12 months.

The required sample size was calculated using the standard simple random sampling (SRS) formula for a proportion. A sample size of 600 was calculated to achieve a design relative standard error (RSE) of 2% on the proportion of patients presenting for emergency public dental care, which was estimated to be 80%. The sample size was then adjusted to allow for sample attrition, resulting in a final target sample size of 1050.

Table 3.1: Selection criteria used to recruit participants in the baseline study

Selection criteria	Emergency sample	General sample
Emergency dental care sought	✓	NA
Requested to be placed on the waiting list for general dental care	NA	✓
New to the waiting list	NA	✓
Have not visited a dentist (private or public) for routine dental care in the last 12 months†	NA	✓
Aged 18 years or more	✓	✓
Dentate with 6+ teeth	✓	✓
Holder of a current government concession card	✓	✓

† Patients who received emergency dental care in the last 12 months were included provided they were not already on the waiting list for routine dental care

NA Not applicable

3.4.2 Data collection

There were three stages involved in collecting the necessary data for the baseline study. Upon meeting the eligibility criteria, all participants completed a structured interview on personal characteristics and subjective oral health status indicators, were clinically examined and were then tracked through the provision of treatment within the public dental clinic. Reception staff at the clinic administered the structured interview, while two SADS dentists were involved in collecting the necessary clinical data. One dentist carried out the oral examination while another subsequently provided the dental care. A more detailed description of this collection process is provided below in Sections 3.4.2.1–3.4.2.3. In addition, Table 3.5 summarises the types of self-reported and clinical data collected on baseline participants.

For the purpose of this research, data collected from the structured interview, dental examinations and records of service provision were used to describe the baseline characteristics of those attending public dental clinics for emergency and general dental care.

3.4.2.1 Structured interview

Upon presentation to the public dental clinic for emergency or general dental care, sampled participants completed a structured interview administered by reception staff (see Appendix B for a copy of the structured interview questions that were used to collect the baseline data used for this research). Participants were asked about their socio-demographic circumstance (e.g., patient's age, sex, country of birth, indigenous status and language mainly spoken at home, level of education, concession card status), dental visiting behaviour (e.g., usual reason for visiting the dentist, time since last visit, site of last visit, frequency of dental visiting), presence of any symptoms related to various oral diseases and disorders and psychosocial impact of various oral diseases and disorders (subjective indicators were taken from Locker's battery of eight Subjective Oral Health Status Indicators (SOHSI) (Locker, 1997) and psychosocial impact was measured using the shortened version of the Oral Health Impact Profile (OHIP-14) (Slade, 1997)), and dental anxiety (Corah, 1969). All responses to items given in the structured interview were entered onto an interview record form with pre-coded closed response categories.

3.4.2.2 Oral examination

Following the structured interview, participants underwent a clinical examination/oral health assessment. This assessment was performed by one of the SADS clinic dentists. The attending assessing dentist recorded epidemiological measures that included coronal status (e.g., DMFT) and periodontal condition (i.e., Community Periodontal Index (CPI)). Written instructions, which followed the National Institute of Dental Research criteria for decayed, missing and filled indices in permanent teeth (DMFT index) (NIDR, 1991) were provided to SADS dentists conducting the examinations (see Appendix B for a copy of the data collection instrument). There were 9 possible codes that were used to record the state of crowns and, in applying the CPI, a score of 0, 1, 2, 3, or 4 was assigned for each dentate sextant or an 'X' for edentulous or excluded sextants. The recorded status of teeth and periodontal tissues reflected their apparent condition at the time of the assessment. Oral health status data (or epidemiological measures) were evaluated using visual and tactile information alone. The criteria used to record coronal status and periodontal condition are described in Table 3.2 and Table 3.3 respectively. The definitions in the tables allowed assessing dentists to enumerate data items using their prevailing clinical judgment. Further to clinically examining the patient, the assessing dentist also compiled a proposed treatment plan for the patient.

Table 3.2: Coding criteria for coronal status

Notation	Description	Definition	Clinical guidelines
D_1	Precavitated decay	'White spot lesions' of enamel on smooth surfaces (i.e., demineralised area with chalky white appearance when tooth is dried).	
D_3	Decayed crown	A permanent tooth crown with untreated primary caries – this excludes caries which is continuous with an existing restoration (i.e., recurrent caries, coded separately as 'R'). The 'D' code is also used when more than three-quarters of the tooth crown has been destroyed by caries and only the root remains.	The clinical judgment of the examining dentist should be used to ascertain questionable carious lesions. If there is a doubt, the criteria of softened floor, undermined enamel or softened wall should be used for judging decay. The 'D' code takes precedence over any other status of the crown (codes 'R', 'F' or 'Fu').
R	Recurrent caries	A permanent tooth crown with a carious lesion that is continuous with the margin or floor of a filling.	The clinical judgment of the examining dentist should be used to ascertain questionable carious lesions. If there is doubt, the same criteria of softened floor, undermined enamel or softened wall used for judging decay should be used for questionable lesions. The 'R' code takes precedence over any other restored part of the crown (codes 'F' or 'Fu').
F	Filled	A permanent tooth crown which has a restoration, placed originally for the treatment of caries. Temporary restorations (placed because of caries) should be coded as 'Fu'.	Fillings judged to have been placed for reasons other than caries (e.g., trauma, abrasion or attrition) are excluded. For full crown coverage, assess the reason for placement and code as 'F' if the original reason was the treatment of caries. Abutment teeth with full coverage should be coded as 'F'.
Fu	Filled (unsatisfactory)	A permanent tooth crown which has a restoration, placed originally for the treatment of caries, which currently is unsatisfactory for reasons other than caries. This includes temporary restorations.	This code may be designated if the filling is to be replaced or partially replaced because part of it is missing, fractured or poorly contoured. Fillings which have only 'technical' defects and which will not be replaced should be coded simply as 'F'. Unsatisfactory restorations originally placed for reasons other than caries (e.g., for trauma) are excluded. Coding 'Fu' takes precedence over any satisfactorily restored part of the crown (code 'F').
E	Extracted (caries/perio)	A permanent tooth missing primarily due to caries or periodontal disease.	The abbreviation 'extraction' is used for convenience. However, it is not necessarily pre-condition for coding crowns into this category. For example, periodontally involved teeth that exfoliated would nonetheless be regarded as extracted and coded as 'E'. Exclude teeth that are missing because of trauma, orthodontics or other non-carious factors.
M	Missing (other reasons)	A permanent tooth missing for reasons unrelated to caries or periodontal disease (e.g., orthodontic extractions or trauma).	When there is doubt about the status of an absent tooth, it should be coded as 'M'.
U	Unerupted	A permanent tooth which is unerupted or congenitally absent.	A partially erupted tooth should be regarded as present when any part of the tooth can be touched with an explorer and it should be coded according to its caries experience.
S	Sound	A tooth crown with no evidence of treated or untreated caries.	This code includes teeth with fillings placed because of trauma or aesthetic reasons. Teeth with fissure sealants and no evidence of treated or untreated decay are coded as sound. If there is doubt about the presence of caries in a questionable lesion, it should be coded as sound, 'S'.

Table 3.3: CPI coding scheme

Code	Description	Definition
X	Excluded	Code as 'X' when there are no teeth in the sextant or there is only one tooth that could be probed. Third molars are excluded unless they are functioning in the place of second molars. Teeth indicated for extraction are regarded as excluded, and are not assessed. If there is only one tooth available for assessment in a sextant, the sextant should be coded as 'X', but the score for a single tooth in an excluded sextant is 'carried forward' to be considered in assessing the adjacent sextant.
4	Pocket/crevice 6mm or more	Any site around any tooth in a given sextant with a periodontal pocket/crevice of 6mm or more in depth results in a sextant score of 4. This can be detected quickly by determining if the CPI probe can enter the pocket/crevice beyond the width of the shaded band. If any site in the sextant has a pocket/crevice depth of 6mm or more, record code 4 and move to the next sextant.
3	Pocket/crevice 4-5mm	When any site around any tooth in a given sextant has a periodontal pocket/crevice between 4mm and 5mm but less than 6mm (code 4) in depth, the sextant is given a score of 3. This corresponds to the CPI probe entering the pocket/crevice up to any part of the shaded band.
2	Calculus	When no sites have pocket/crevices of 4mm+ but calculus can be detected at any supra- or subgingival site using visual or tactile sense, the sextant score is 2. The ball at the end of the CPI probe helps detect subgingival calculus.
1	Gingival bleeding	When no sites have calculus or pocket/crevices of 4mm+, but gingival bleeding occurs after probing at any site, the sextant is given a score of 1.
0	Periodontal health	A score of 0 is assigned to a sextant when none of the previously described conditions can be detected.

Note:

Sextants were defined by tooth position: molars and premolars made up four posterior sextants (upper left, upper right, lower left and lower right) while canines and incisors made up two anterior sextants (upper and lower). Third molars were excluded unless they were functioning in the place of second molars. A periodontal probe was used to measure pocket/crevice depth (from gingival crest to base of pocket/crevice) and to detect subgingival calculus or bleeding. A 'CPI' periodontal probe which had shading between 4mm and 6mm was used for this purpose. Periodontal tissues were probed to determine pocket depth and the presence of calculus and bleeding.

3.4.2.3 Service provision

Following the oral assessment, a second dentist, who was blinded to the assessing dentist's clinical examination and dental care recommendations/proposed treatment plan, provided emergency and general dental care for all participants. Encoded service provision items of emergency or general treatment provided were recorded on a clinical record form (see Appendix B) or in a computerised MIS operating in the clinics. The information collected at the treatment phase related to treatment and services provided and the number of visits made to complete the course of care. Service items were collected at the level of individual service items, using the three-digit coding scheme of the Australian Dental Association (ADA) (1992). Using this coding scheme, service items were aggregated into one of 10 main areas of service, as outlined in Table 3.4.

A clinical judgment (of the treating dentist) on the oral health outcome at the completion of a course of care in terms of the risk of further oral disease, likelihood of compliance with preventive advice, and expectations for future maintenance course of care were also collected.

Table 3.4: Ten main areas of service

Main area of service	ADA codes
Diagnostic services	Items 011-099
Preventive services	Items 111-199
Periodontic services	Items 211-299
Oral surgery services	Items 311-399
Endodontic services	Items 411-499
Restorative services	Items 511-599
Crown and bridge services	Items 611-699
Prosthodontic services	Items 711-799
Orthodontic services	Items 811-899
General/miscellaneous services	Items 911-979 / 981-999

3.4.3 Data linkage

The epidemiological data, clinical record form and structured interview data were coded and entered as data files linked by unique identifiers. All participants provided signed consent for participation in the study. The consent form signed by participants gave authorisation to the researchers to access the data captured as part of their clinical care and link it to the information collected from the structured interview.

Table 3.5: Data collected for the baseline study

Oral health outcomes measured by clinical assessment	Service provision	Self-reported oral health outcomes	Subjects' predisposing and enabling characteristics	Subjects' reported dental care use
- Teeth present (i.e., dentate status) - Coronal and root caries experience - Periodontal disease status (i.e., CPI)	- Visit details and services received during a COC - oral health outcome at the completion of a course of care (i.e., risk of further oral disease, likelihood of compliance with preventive advice, and expectations for future maintenance course of care)	- Dental/oral signs and symptoms (i.e., oral and facial pain symptoms) - Social and psychological impact of oral disorders - Dental anxiety	- Patient's age, sex, country of birth, indigenous status, language mainly spoken at home, education level, concession card status, dental insurance	- Usual reason for visiting the dentist, time since last dental visit, site of last dental visit, frequency of visiting the dentist

3.4.4 Statistical approach

Analyses were conducted using the Statistical Package for the Social Sciences (SPSS) v12.0.1 for Windows. Chi-square tests of independence were used to examine relationships between the categorical independent variables (i.e., demographic characteristics, dental visiting factors and distribution of service mix) and the dependent variable (i.e., baseline sample status, defined as either emergency or general baseline participant). Analysis of variance (ANOVA) was also used to examine relationships between the continuous independent variables (i.e., oral health status measures and service provision measures) and baseline sample status. In order to more fully understand the effects of patients' demographic characteristics, dental visiting behaviours and oral health status on emergency dental visiting and the receipt of oral surgery services, binary logistic regression models were used to estimate the effect of each independent variable after controlling for the effects of the other independent variables. In the first model examining emergency dental visiting as the outcome variable, an emergency dental visit was coded as 1, otherwise as 0, and in the second model examining the provision of oral surgery services as the outcome variable, the receipt of an oral surgery service was coded as 1, otherwise as 0. The results of the logistic regression models are presented as odds ratios with 95% confidence intervals. An odds ratio of 1.0 indicates that the odds of the outcome variable are the same for the explanatory variable in relation to the reference category. Odds ratios greater than 1.0 indicate higher odds of the outcome for the explanatory variable in relation to the reference category, and odds ratios less than 1.0 indicate lower odds of the outcome for the explanatory variable in relation to the reference category. For each of the models, P-values were also given so as to indicate the joint effect of a group of dummy variables that formed the categorical independent variable. This allowed the testing of the variable as a whole, as well as the individual dummies, so that its relationship with the outcome variable could be interpreted correctly. Note that the significance level of the indicator variables is also influenced by the nominated reference category, but the statistical significance of the categorical variable as a whole does not depend upon the reference category used. An estimate of R^2 (i.e., the percent of variance explained) was given by the Nagelkerke pseudo R^2 statistic.

3.5 Results

3.5.1 Sample sizes

A total of 427 and 471 eligible patients requesting emergency dental care and general dental care respectively were recruited across eleven CDS clinics for the baseline study in South Australia. The overall yield for the study was 85.5% of the target sample size. Table 3.6 presents the sample sizes achieved for each data collection mode for the emergency and general components of the baseline study.

Table 3.6: Sample sizes

	Mode of data collection (*n*)		
Baseline sample	**Structured interview**	**Oral examination**	**Service provision**
Emergency	427	424	424
General	471	470	467
Total	**898**	**894**	**891**

3.5.2 Characteristics of respondents

Socio-demographic characteristics of respondents for each sample at baseline are presented in Table 3.7. Emergency and general dental care samples were reasonably homogenous with respect to socio-demographic characteristics, with only educational attainment and type of concession card held varying significantly between the samples (χ^2 test; $P<0.01$).

There is an over-representation of females in each sample, which is possibly due to reputed higher usage of dental services by women.

By age, the largest proportion of patients were in the 24–44 year age group (37.4% and 39.7% in the emergency and general sample respectively) while the lowest proportion of patients were in the youngest age group category (18–24 years), which spanned only seven years (7.1% and 10.4% in the emergency and general sample respectively).

The majority of respondents were born in Australia (65.0% and 60.1% in the emergency and general sample respectively) and mainly spoke English at home (93.4% and 89.8% in the emergency and general sample respectively). Also, there were very few Aboriginal or Torres Strait Islanders in both samples (1.8% and 1.1% in the emergency and general sample respectively).

The majority of respondents in each sample had completed some or all of their secondary school education (63.3% and 59.4% in the emergency and general sample respectively). However, a greater percentage of respondents in the general sample had some form of post-secondary education (32.6% cf. 26.1%).

A greater proportion of emergency patients had a pensioner concession card. Just over 62% of patients presenting for emergency dental care held a full-entitlement pensioner concession card compared with 48.5% of general patients. Just over one third of the emergency respondents had a health care card, compared with 45.1% of the general respondents. The majority of respondents in both samples also reported having no private dental insurance.

Dentate status did not differ significantly between baseline samples, with the majority of respondents in each sample reporting having natural teeth only (77.5% and 82.6% in the emergency and general sample respectively).

Dental anxiety scores differed between samples, with significantly more emergency respondents reporting being dentally anxious (17.7% cf. 10.0%).

A greater proportion of general patients reported having good oral health, whilst there were more emergency patients reporting poor oral health. The general patients were more likely to report good oral health compared to the emergency patients (48.3% cf. 41.3%), whereas the emergency patients were more likely to perceive their oral health as poor when compared to the general patients (23.5% cf. 16.2%).

Table 3.7: Characteristics of the baseline sample

Demographic characteristics	Emergency patients (%)	General patients (%)
Sex of Patient	*n*=427	*n*=471
Male	43.3	41.0
Female	56.7	59.0
Age Group	*n*=425	*n*=469
18–24 years	7.1	10.4
25–44 years	37.4	39.7
45–64 years	32.5	27.9
65+ years	23.1	22.0
Born in Australia	*n*=426	*n*=471
Yes	65.0	60.1
No	35.0	39.9
Language spoken at home	*n*=426	*n*=471
English	93.4	89.8
Other	6.6	10.2
Indigenous status	*n*=426	*n*=470
No	98.1	98.9
Yes, Aboriginal or Torres Strait Islander	1.8	1.1
Highest level of education**	*n*=426	*n*=471
Primary school	8.2	6.4
Some secondary school	46.9	33.8
Completed secondary school	16.4	26.1
Some university, higher education	4.9	7.9
Completed university, higher education	5.2	8.1
Some TAFE, CAE or vocational course	5.4	7.0
Completed TAFE, CAE or vocational course	10.6	9.6
Other	2.3	1.3
Health care card status**	*n*=427	*n*=470
Pensioner Concession Card (Full) only	62.3	48.5
Pensioner Concession Card (Part) only	1.9	4.0
Health Care Card only	34.4	45.1
Other card/s	1.4	2.3
Private dental insurance	*n*=427	*n*=471
Yes	4.0	5.1
No	96.0	94.9
Dentate status	*n*=422	*n*=470
Natural teeth only	77.5	82.6
Natural teeth & denture (upper &/or lower)	22.5	17.4
DAS score†**	*n*=423	*n*=471
DAS < 13	82.3	90.0
DAS ≥ 13	17.7	10.0
Self-rated oral health*	*n*=421	*n*=470
Very good	8.8	8.7
Good	32.5	39.6
Fair	35.2	35.5
Poor	17.3	13.4
Very poor	6.2	2.8

**(P<0.01), *(P<0.05) ; χ^2 test

† The Dental Anxiety Scale (DAS) consisted of four items developed by Corah (1969). Respondents were asked to indicate on a five-point scale how the statement made them feel. The scale was scored by summing the responses to obtain a score between 4 and 20. A minimum score of 4 indicated no dental anxiety and a maximum score of 20 indicated that the patient was dentally phobic. Respondents with a score of 13 or more were considered dentally anxious.

3.5.3 Dental visiting patterns

Dental visiting behaviours of respondents in each sample at baseline are described in Table 3.8.

Dental visiting pattern is a useful indicator of service use since it distinguishes between the preventive and symptomatic user. It can be an indicator of inequity and an important predictor of dental health outcomes (Locker et al., 1991).

There were significant differences between the samples by usual reason for visiting the dentist, time since last dental visit, place of last dental visit and frequency of dental visits (χ^2 test; P<0.01).

In the emergency sample, just over 81% of patients reported that a dental problem or pain was their usual reason for visiting the dentist, cf. 44.3% in the general sample. Over 50% of the general sample patients usually visited the dentist for a check-up.

Almost 50% of emergency respondents had visited a dentist in the last 12 months, cf. 27.1% of the general sample. However, it should be noted that general respondents who last visited a dentist 12 months ago would have visited for emergency care, since the inclusion criteria for the general baseline sample states that patients should not have visited the dentist for routine dental care in the last year.

Some 73% of emergency respondents had received their last course of care at a public hospital or clinic, cf. 54% of the general sample. Over one third of the general sample last went to a private practice, but there is no way of knowing if this was publicly subsidised care.

Emergency patients were attending the dentist more frequently, with almost 41% of emergency patients indicating that they would usually go to the dentist at least once a year, cf. 29% of general patients.

Overall, emergency patients were more likely to report a problem or pain as their usual reason for a dental visit, whilst the opposite was true for general patients. Emergency patients had a visiting pattern of more recent care than general patients, with emergency patients being more likely to have visited in the last 12 months and less likely to have visited 5 or more years ago. Emergency patients were more likely to have last visited a public hospital or clinic than general patients. Emergency patients were also attending the dentist more frequently than general patients.

Table 3.8: Dental visiting patterns of the baseline sample

Dental visiting characteristics	Emergency patients (%)	General patients (%)
Usual reason for visit**	*n*=427	*n*=470
Check-up	17.1	51.5
Problem/pain	81.3	44.3
Check-up/problem/pain	1.6	4.3
Time since last visit**	*n*=427	*n*=469
<12 months	50.1	27.1
12–<2 years	18.7	20.3
2–<3 years	10.1	15.8
3–<5 years	9.1	17.7
5+ years	11.9	19.0
Never	–	0.2
Place of last visit**	*n*=426	*n*=464
Private practice	21.1	35.3
Public hospital/clinic	73.0	53.7
School Dental Service	4.0	8.8
Other	1.9	2.2
Frequency of dental visits**	*n*=427	*n*=471
More than 2 times a year	8.2	5.6
2 times a year	8.0	7.5
Once a year	24.6	16.1
Once every 2 years	30.0	34.0
Once every 5 years	11.7	23.3
Less often than once every 5 years	17.4	13.5

**($P<0.01$); χ^2 test

3.5.4 Oral health status

In order to determine the oral health status of emergency and general dental care patients at baseline, various indicators were used. These included dentate status, periodontal condition and disease experience measured by the number of decayed, missing and filled teeth.

3.5.4.1 Dentate status

Dentate status was determined by calculating the number of teeth present. The number of teeth present for each participant was derived by summing the number of teeth determined to be sound, decayed and/or filled. There were significant differences between the samples in terms of the number of teeth (see Table 3.9). General patients had on average 1.79 more teeth than emergency patients.

Table 3.9: Dentate status of baseline sample

	Emergency			General		
Variable	***n***	**Mean**	**SD**	***n***	**Mean**	**SD**
Number of teeth*	424	22.953	6.242	470	24.745	5.557
Number of teeth*†	407	23.206	6.077	456	24.770	5.597

*(P<0.0001); ANOVA

† The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).

3.5.4.2 Periodontal status

Periodontal status was recorded using CPI, and is presented as a percentage of patients categorised by their maximum sextant scores. According to Table 3.10, most adults showed signs of periodontal or gingival disease. Pockets of 4 to 5mm and 6mm or more were experienced by a greater percentage of emergency patients than general patients (44.6% cf. 13.1%). Overall, the emergency sample appeared to have worse periodontal conditions.

Table 3.10: Percentage of baseline sample categorised by their maximum CPI score

		Emergency sample %	General sample %
		n=390	*n*=450
Maximum CPI Score**	0 – Periodontal health	5.6	14.0
	1 – Gingival bleeding	6.7	21.3
	2 – Calculus	43.1	51.6
	3 – Pocket 4 to 5mm	36.7	9.1
	4 – Pocket 6mm or more	7.9	4.0

**(P<0.001); χ^2 test

3.5.4.3 Disease experience

Disease experience was measured as the number of untreated decayed teeth (D_3), missing teeth (M) extracted due to caries or periodontal disease, and filled teeth (F) restored due to caries. Table 3.11 presents disease experience among emergency and general dental care patients.

Emergency patients had a higher average number of decayed teeth and missing teeth than general patients. The emergency sample had, on average, 0.6 more decayed teeth and 1.3

more missing teeth than the general sample. However, there was little difference in the number of filled teeth between emergency and general patients.

Table 3.11a: Mean decayed, missing and filled teeth for the baseline sample

	Emergency (n=406)		General (n=451)		Total (n=857)	
Variables	**Mean†**	**SD**	**Mean†**	**SD**	**Mean†**	**SD**
D_3 crowns (D+R)**	1.660	2.697	1.100	2.209	1.365	2.467
M crowns (E+M)**	8.180	6.282	6.907	5.585	7.510	5.956
F crowns (F+Fu)	8.559	5.620	8.494	5.844	8.525	5.735
D_1 and D_3 crowns (D_1+D+R)**	1.768	2.806	1.186	2.436	1.462	2.632
D_1 crowns	0.108	0.569	0.086	0.730	0.097	0.658
D_3MFT (D_3+M+F)***	18.399	7.525	16.501	7.867	17.400	7.761
D_1D_3MFT (D_1+D_3+M+F)***	18.507	7.449	16.588	7.860	17.497	7.723

† The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).

***(P<0.001), **(P<0.01), *(P<0.05); ANOVA

The table above (Table 3.11a) presents the calculations for those with matching service provision data forms – the table below (Table 3.11b) presents the data for everyone with a completed oral health data form.

Table 3.11b: Mean decayed, missing and filled teeth for the baseline sample

	Emergency (n=407)		General (n=456)		Total (n=863)	
Variables	**Mean†**	**SD**	**Mean†**	**SD**	**Mean†**	**SD**
D_3 crowns (D+R)*	1.671	2.702	1.092	2.199	1.365	2.465
M crowns (E+M)*	8.164	6.282	6.953	5.672	7.525	5.995
F crowns (F+Fu)	8.553	5.614	8.480	5.862	8.515	5.743
D_1 and D_3 crowns (D_1+D+R)*	1.779	2.810	1.182	2.424	1.464	2.629
D_1 crowns	0.108	0.569	0.090	0.731	0.099	0.659
D_3MFT (D_3+M+F)**	18.388	7.519	16.526	7.897	17.404	7.772
D_1D_3MFT (D_1+D_3+M+F)**	18.496	7.444	16.616	7.883	17.503	7.732

† The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).

**(P<0.001), *(P<0.05); ANOVA

3.5.5 Service provision

The following section examines various aspects of service provision among emergency and general patients and includes details of the number of visits made to complete the CoC, the mean number of services per CoC, the proportion of emergency and general patients receiving particular types of services at baseline, the most common services received by emergency and general patients, and the distribution of service-mix among the samples. The variables in the following analyses represent the main areas of service which follow the ADA Schedule of Dental Services (1992). Service items were initially collected at the level of a dental visit and were subsequently aggregated into one of 10 main areas of service.

3.5.5.1 Visit details

Normally people presenting for emergency care only make or require one visit to obtain treatment to relieve the problem. For the general sample a CoC entailed on average 2.8 visits. More visits appeared to translate to more teeth treated (see Table 3.12).

Table 3.12: Visit characteristics among the baseline sample

	Emergency			General		
Variable	***n***	**Mean**	**SD**	***n***	**Mean**	**SD**
Number of visits/CoC *	423	1.000	0.069	455	2.796	2.080
Number of teeth treated *	424	1.118	0.576	467	2.253	2.611

*(P<0.0001); ANOVA

3.5.5.2 Distribution of services per visit

Table 3.13 presents the distribution of services per visit broken down by main area of service and baseline sample status. On average, emergency dental patients had a significantly higher rate of services per visit than general dental care patients (2.67 cf. 2.35). Compared to general patients, emergency patients had a higher rate of diagnostic services (1.32 cf. 0.94), oral surgery services (0.34 cf. 0.08), endodontic services (0.08 cf. 0.02) and general/miscellaneous services (0.14 cf. 0.03) per visit, but a lower rate of preventive services (0.16 cf. 0.59) per visit.

Table 3.13: Distribution of services *per visit* by main area of service and baseline sample

Main service area	Emergency (*n*=424) Mean	SD	General (*n*=467) Mean	SD	Total (*n*=891) Mean	SD
Diagnostic services***	1.322	0.693	0.938	0.637	1.121	0.691
Preventive services***	0.158	0.506	0.592	0.707	0.385	0.656
Periodontic services	0.024	0.205	0.008	0.076	0.015	0.152
Oral surgery services***	0.337	0.628	0.083	1.074	0.204	0.899
Endodontic services***	0.080	0.312	0.018	0.086	0.048	0.226
Restorative services	0.586	0.678	0.640	0.747	0.614	0.715
Crown and bridge services	0.012	0.128	0.001	0.023	0.006	0.090
Prosthodontic services	0.009	0.119	0.036	0.283	0.024	0.221
Orthodontic services	–	–	–	–	–	–
General/miscellaneous services***	0.144	0.371	0.029	0.175	0.084	0.291
Total services* **	2.672	1.051	2.346	1.636	2.501	1.397

***(P<0.0001); ANOVA

3.5.5.3 Distribution of services per CoC

Table 3.14 presents the distribution of services per CoC broken down by main area of service and baseline sample status. Across the total sample, emergency dental patients had a significantly lower rate of services per CoC, on average, than general dental care patients (2.68 cf. 5.81). Compared to general patients, emergency patients had a lower rate of diagnostic services (1.33 cf. 1.91), preventive services (0.16 cf. 1.31), restorative services (0.59 cf. 2.06), and prosthodontic services (0.01 cf. 0.10) per CoC, but a higher rate of oral surgery services (0.34 cf. 0.19) and general/miscellaneous services (0.14 cf. 0.09) per CoC.

Table 3.14: Distribution of services *per CoC* by main area of service and baseline sample

Main service area	Emergency (*n*=424) Mean	SD	General (*n*=467) Mean	SD	Total (*n*=891) Mean	SD
Diagnostic services***	1.325	0.693	1.914	1.071	1.634	0.957
Preventive services***	0.158	0.506	1.306	1.581	0.760	1.327
Periodontic services	0.024	0.205	0.039	0.363	0.031	0.298
Oral surgery services*	0.337	0.628	0.188	1.220	0.259	0.986
Endodontic services	0.080	0.312	0.099	0.498	0.090	0.420
Restorative services***	0.592	0.681	2.064	2.684	1.364	2.130
Crown and bridge services	0.012	0.128	0.004	0.093	0.008	0.111
Prosthodontic services**	0.009	0.119	0.105	0.687	0.059	0.506
Orthodontic services	–	–	–	–	–	–
General/miscellaneous services*	0.144	0.371	0.090	0.425	0.116	0.401
Total services* **	2.682	1.043	5.809	4.257	4.321	3.528

***(P<0.0001), **(P<0.01), *(P<0.05); ANOVA

3.5.5.4 Distribution of service mix among baseline sample

Table 3.15 shows the percentage of patients who had a least one service from the 10 main service areas within a course of care. There was a large difference in the percentage of patients receiving preventive services in each sample. Some 11.1% of patents in the emergency sample received preventive services compared to 72.8% of patients in the general sample, showing that emergency care was aimed at immediate treatment to relieve the problem rather than maintenance and prevention. A significantly greater proportion of emergency patients received oral surgery services, mostly simple extractions, compared to general patients (27.4% cf. 8.4%), whilst the receipt of restorative services was significantly higher amongst the general sample than the emergency sample (60.8% cf. 49.1%). Diagnostic services were also received by fewer emergency patients than general patients (92.0% cf. 95.7%), as were prosthodontic services (0.7% cf. 4.1%). Interestingly, emergency patients were shown to have worse periodontal conditions, but fewer emergency patients received periodontal services than general patients (1.7% cf. 2.4%).

Given the variation that exists in main service categories between samples, types of services received in each sample will be examined to shed some light on what procedures are actually being received by patients presenting for different types of dental care. This may also provide information about the comprehensiveness of care in each sample.

Table 3.15: Proportion of persons receiving services during a course of care

	Emergency %	General %
	n=424	*n*=467
Diagnostic services*	92.0	95.7
Preventive services***	11.1	72.8
Periodontic services	1.7	2.4
Oral surgery services***	27.1	8.4
Endodontic services	7.1	4.9
Restorative services***	49.1	60.8
Crown and bridge services	0.9	0.2
Prosthodontic services**	0.7	4.1
Orthodontic services	0.0	0.0
General/miscellaneous services***	13.7	6.6

***(P<0.0001), **(P<0.01), *(P<0.05); χ^2 test

3.5.5.5 Most common services by per cent of procedures

Emergency

Table 3.16 lists the 10 most frequently provided services by per cent of procedures for the emergency sample. The 10 most frequently provided services account for 77.9% of procedures received by emergency patients in the sample.

Three diagnostic services were among the most frequently provided services. These were emergency oral examination, periapical or bitewing radiographs and letter of referral. Together these three services constituted 49.6% of procedures. Glass ionomer restorations, either one-, two-, or three or more-surface(s) were also among the most common procedures and combined represented 11.2% of procedures. The simple extraction of a permanent tooth was also among the most frequently provided procedures, accounting for 11.0% of procedures.

For the 11.1% of emergency patients receiving preventive services (as shown in Table 3.15), the actual preventive service most frequently provided, constituting 2.3% of procedures, was simply an oral hygiene instruction.

Table 3.16: Most commonly provided procedures for the emergency sample at baseline

ADA code	Service	% of procedures
013	Emergency oral examination	34.5%
022	Periapical/bitewing x 1	13.4%
311	Removal of permanent tooth or part(s) thereof	11.0%
521	Glass ionomer 1-surface	3.9%
522	Glass ionomer 2-surface	3.7%
523	Glass ionomer 3 or more-surface	3.6%
141	Oral hygiene instruction	2.3%
924	Drug prescription	2.0%
419	Extirpation of pulp or debridement of root canal(s) – emergency	1.8%
019	Letter of referral	1.7%
513	Amalgam restoration 3 or more-surface	1.6%
538	Composite resin 2-surface – anterior tooth	1.6%
539	Composite resin 3 or more-surface – anterior tooth	1.5%
023	Periapical/bitewing x 2	1.4%
911	Palliative emergency care	1.2%
316	Removal of additional tooth or part(s) thereof (complimentary to 311)	1.0%
113	Recontouring existing restoration	1.0%

General

Table 3.17 lists the 10 most frequently provided services by per cent of procedures for the general sample. The 10 most frequently provided services constituted approximately 67% of procedures received by general dental care patients.

Four restorative services were among the most frequently provided services. These were glass ionomer restorations, either one- or two-surface(s) and composite resins either one- or two-surface(s). Together these four services constituted 21.6% of procedures. Four preventive services were also among the most frequently provided services. These were removal of supragingival calculus and plaque, removal of supra & subgingival calculus and plaque – 1st visit, recontouring of existing restoration and oral hygiene instruction. Together these four services constituted 18.5% of procedures. The diagnostic services initial oral examination and periapical or bitewing radiographs were also among the most common procedures and combined represented 26.8% of procedures.

Table 3.17: Most commonly provided procedures for the general sample at baseline

ADA code	Service	% of procedures
011	Initial oral exam	16.5%
521	Glass ionomer 1-surface	11.9%
023	Periapical/bitewing x 2	10.3%
112	Removal of supragingival calculus and plaque	6.7%
114	Removal of supra and subgingival calculus and plaque – first visit	6.6%
522	Glass ionomer 2-surface	4.1%
537	Composite resin 1-surface – anterior tooth	3.1%
141	Oral hygiene instruction	2.7%
113	Recontouring existing restoration	2.5%
538	Composite resin 2-surface – anterior tooth	2.5%
161	Fissure seal	2.3%
529	Adhesive restoration of non-carious cervical lesion	2.3%
311	Removal of permanent tooth or part(s) thereof	2.1%
012	Periodic oral examination	1.7%
022	Periapical/bitewing x 1	1.6%
513	Amalgam restoration 3 or more-surface	1.5%
539	Composite resin 3 or more-surfaces – anterior tooth	1.4%
024	Periapical/bitewing (up to seven) additional to item 023	1.3%
511	Amalgam restoration 1-surface	1.3%
523	Glass ionomer 3 or more-surface	1.2%
316	Removal of additional tooth or part(s) thereof (complimentary to 311)	1.1%
111	Removal of plaque	1.0%
531	Composite resin 1-surface – posterior tooth	1.0%
037	Panoramic radiograph (for example OPG)	1.0%

Distribution of service-mix by per cent of procedures

The mix of services received by each sample indicates the range and type of care being provided. The differences in service-mix among the samples may also reflect the different treatment philosophies of dentists when treating patients presenting for different types of care. A number of factors contribute to service provision, with various studies showing nature of the dental visit and patient and dentist characteristics influencing treatment provided (Brennan, Spencer and Szuster, 2000; Brennan and Spencer, 2002).

Table 3.18 presents the distribution of the service-mix among the emergency and general baseline samples. Higher percentages of diagnostic and oral surgery services were associated with emergency care, whilst general care was associated with higher percentages of preventive and restorative services.

Table 3.18: Distribution of service-mix among baseline samples

	Emergency %	95%CI[a]	General %	95%CI[a]
Diagnostic services**	52.2	(48.0%, 56.3%)	34.1	(31.3%, 37.8%)
Preventive services **	6.0	(0.2%, 11.8%)	23.6	(20.3%, 27.3%)
Periodontic services	0.9	(*, 6.8%)	0.7	(*, 4.6%)
Oral surgery services **	13.1	(7.6%, 18.7%)	3.4	(*, 7.3%)
Endodontic services	3.1	(*, 9.0%)	1.8	(*, 5.6%)
Restorative services **	19.2	(13.9%, 24.6%)	33.3	(29.7%, 36.2%)
Crown and bridge services	0.4	(*, 6.4%)	0.1	(*, 4.1%)
Prosthodontic services	0.4	(*, 6.3%)	1.8	(*, 5.5%)
Orthodontic services	0.0	–	0.0	–
General/miscellaneous services	4.7	(*, 10.6%)	1.4	(*, 5.4%)

** ($P<0.05$)
a 95%CI = $p \pm (1.96 \times \text{Std Error})$ where Std Error=$\sqrt{p(1-p)/n}$
* negative lower limit not reported

3.5.6 Predictors of emergency visiting and receipt of oral surgery

3.5.6.1 Emergency dental visiting

Logistic regression analysis was carried out to determine which effects had an independent association with emergency visiting. Socio-demographic characteristics of respondents, dental visiting factors and oral health status data were entered into a backward step binary logistic regression model. The results of the binary logistic regression analysis were summarised using beta coefficients and odds ratios with 95% confidence intervals, and are presented in Table 3.19.

Country of birth, card type, usual reason for dental visit, site of last visit, frequency of dental visiting, time since last dental visit, oral health rating, number of decayed teeth and maximum CPI score all had independent effects (P<0.05) (Nagelkerke R^2=0.410).

Results presented in Table 3.19 show the likelihood of a person with given socio-demographic characteristics, dental visiting patterns and oral health status visiting the dentist for an emergency dental problem. Once all other factors in the model were accounted for, usual reason for visiting the dentist had the largest effect on the odds of making an emergency dental visit. Overall, odds ratios indicated that emergency visits were:

1. 1.6 times the odds among those born in Australia compared with those born overseas;
2. 4 times the odds among PCC (Full) holders and almost 3 times the odds among PCC (Part) holders compared with HCC holders;
3. Almost 7.5 times the odds among people reporting a problem/pain as their usual reason for visiting the dentist compared with those reporting a check-up as their usual reason for a dental visit;
4. 2 times the odds among those who last visited a public dental clinic/hospital compared with those who last visited privately;
5. Less likely among those who visit the dentist less frequently (i.e., once every 2 years, once every 5 years and less often than once every 5 years) compared with those visiting at least once per year;
6. Less likely among those who last visited 1–<2 years ago or 5+ years ago compared with those who visited in the previous 12 months;
7. 1.5 times the odds among those who report having very good/good oral health compared with those who consider their oral health to be fair/poor or very poor;
8. More likely among those with more decayed teeth; and
9. 4.8 times more likely among those with 4+ mm pockets compared to those with periodontal pockets less than 4mm.

Table 3.19: Logistic regression model for emergency dental visits: beta coefficients, odds ratios and 95% CI

Variable	Beta	OR	95% CI for OR	Sig.
Country of birth				
- Australia	0.441	1.554	(1.080,2.234)	0.017
- Other	REF.			
Card type				0.024
- Pensioner Concession Card (Full) only	1.396	4.038	(1.381,11.806)	0.011
- Pensioner Concession Card (Part) only	1.096	2.992	(1.008,8.881)	0.048
- Health Care Card only	REF.			
- Other card/s	0.491	1.634	(0.309, 8.657)	0.563
Usual reason for dental visit				0.000
- Check-up	REF.			
- Problem/pain	2.002	7.405	(4.724,11.608)	0.000
- Check-up/problem/pain	0.091	1.096	(0.340,3.529)	0.878
Place of last dental visit				0.003
- Private	REF.			
- Public	0.695	2.004	(1.336,3.005)	0.001
- SDS/other	0.481	1.618	(0.801,3.272)	0.180
Frequency of dental visits				0.000
- at least once per year	REF.			
- once every 2 years	-0.733	0.480	(0.304,0.760)	0.002
- once every 5 years	-1.388	0.250	(0.135,0.460)	0.000
- less often than once every 5 years	-0.789	0.454	(0.229,0.902)	0.024
Time since last visit				0.056
- >12 months	REF.			
- 1 year–<2 years	-0.507	0.602	(0.373,0.971)	0.037
- 2 years–<3 years	-0.551	0.576	(0.326,1.020)	0.059
- 3 years–<5 years	-0.607	0.545	(0.295,1.008)	0.053
- 5+ years	-0.813	0.443	(0.225,0.875)	0.019
Oral health rating				
- Very good/good	0.418	1.520	(1.044,2.212)	0.029
- Fair/poor/very poor	REF.			
Maximum CPI score				
- Periodontal pockets <4 mm	REF.			
- Periodontal pockets 4+ mm	1.565	4.783	(3.184,7.185)	0.000
Decayed teeth score	0.075	1.078	(1.001,1.161)	0.048
Model constant	-3.133	0.044		0.000

Analysis used *n*=791 cases with complete data on all variables
REF. Reference category for odds ratio (OR)

3.5.6.2 Receipt of oral surgery

A second logistic regression analysis was carried out in order to determine which effects had an independent association with the receipt of oral surgery services (which, according to the most commonly provided services tables (see Section 3.5.5.5), were primarily extractions). Given the observation about emergency visits in the preceding table, it is anticipated that there could be associations between patient characteristics and receipt of oral surgery. A backward step logistic regression analysis was therefore conducted to ascertain which factors were independently associated with the receipt of oral surgery type services. The results of the binary logistic regression analysis were summarised using beta coefficients and odds ratios with 95% confidence intervals and are presented in Table 3.20.

Visit type, patient's sex, number of decayed teeth, number of filled teeth and periodontal condition all had independent effects ($P<0.05$) (Nagelkerke $R^2=0.267$). Once all other factors in the model were accounted for, visiting the dentist for emergency dental care had the largest effect on the odds of receiving an oral surgery service.

According to the results presented in Table 3.20, emergency patients had almost 3.5 times the odds of receiving oral surgery services compared with general patients and males had 1.8 times the odds of receiving oral surgery services compared with females. In addition, the estimated odds of receiving oral surgery services increased by 30% when the number of decayed teeth increased by one. When the number of filled teeth increased by one, the estimated odds of receiving oral surgery services decreased by 5%. Receipt of oral surgery services was also 1.9 times the odds among those with pocket depth of 4+ mm compared to those with pocket depths of <4 mm.

Table 3.20: Logistic regression model for the receipt of extractions: beta coefficients, odds ratios and 95% CI

Variable	Beta	OR	95% CI for OR	Sig.
Visit type				
- Emergency	1.238	3.448	(2.149,5.532)	0.000
- General	REF.			
Sex				
- Male	0.574	1.775	(1.173,2.687)	0.007
- Female	REF.			
Number of decayed teeth	0.260	1.297	(1.195,1.408)	0.000
Number of filled teeth	-0.054	0.947	(0.909,0.987)	0.009
Maximum CPI score				
- Periodontal pocket <4 mm	REF.			
- Periodontal pocket 4+ mm	0.632	1.881	(1.218,2.905)	0.004
Model constant	-2.863	0.057		0.000

Analysis used n=799 cases with complete data on all variables
REF. Reference category for odds ratio (OR)

3.5.7 Comprehensiveness of care

DMFT scores were recalculated to reflect levels of met and unmet need in both samples after baseline treatment. Before proceeding with this section, recall that there were two independent dentists within the SADS dental clinic who assessed each patient. One dentist conducted the oral health assessment whereby clinical indices were assessed and collected and the other dentist reassessed the patient and provided treatment based on their own clinical assessment of the patient. Thus, errors due to examiner differences (or examiner bias) are potentially introduced at each stage. Dentists can vary on caries diagnoses for individual teeth. It has been recognised for many years that treatment decision-making among dentists often shows wide variation (Bader and Shugars, 1995).

3.5.7.1 Emergency

Some 247 (or 58.4% of) emergency patients in the study initially presented with decayed teeth (i.e., precavitated decay or a decayed crown). Following the receipt of an emergency CoC at baseline, 212 remained with untreated decay, that is, 50.1% of the sample did not appear to have had all their treatment needs met at their emergency dental visit. Alternatively, 85.8% of those presenting with decayed teeth remained with decayed teeth after their emergency CoC.

Before receiving any treatment, emergency dental care patients were presenting with an average of 1.7 decayed teeth. After receiving treatment, emergency patients remained with, on average, 1.4 decayed teeth representing unmet treatment need within this group of adults (see Table 3.21). It would appear that there was an underutilisation of dental services within this group of attenders, as there was a gap between the services a person needs and those that are provided (Retuccia, Payne and Tracey, 1989). If the provision of needed services were adequate, patients would not be walking away with untreated decay. It is this sort of pattern of care that provides the impetus for patients to return for more emergency care, contributing to a cycle of emergency care-seeking behaviour.

With regards to the average number of missing and filled teeth components, these components increased after the receipt of treatment, with the average number of missing and filled teeth increasing by 0.27 and 0.11 respectively.

Table 3.21: Decayed, missing and filled teeth before and after treatment at baseline for the emergency sample

	AT BASELINE† (n=406)		POST-BASELINE‡ (n=406)		
Variables	Mean#	SD	Mean#	SD	Sig.
D_3 crowns (D+R)	1.660	2.697	1.389	2.499	***
M crowns (E+M)	8.180	6.282	8.448	6.285	***
F crowns (F+Fu)	8.559	5.620	8.665	5.521	***
D_1 and D_3 crowns (D_1+D+R)	1.768	2.806	1.498	2.606	***
D_1 crowns	0.108	0.569	0.108	0.569	***
D_3MFT (D_3+M+F)	18.399	7.525	18.502	7.498	***
D_1D_3MFT (D_1+D_3+M+F)	18.507	7.449	18.611	7.421	***

† Before treatment was provided
‡ After treatment was provided
# The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).
*** (P<0.001); Paired samples t-test

3.5.7.2 General

Some 40.9% of general patients in the study initially presented with decayed teeth (i.e., precavitated decay or a decayed crown). After receiving their baseline general CoC, 29.0% remained with untreated decay, so it would appear that not everyone had all their treatment needs met at their general dental care CoC.

Prior to receiving any treatment, general dental care patients were presenting with an average of 1.1 decayed teeth. After receiving treatment, this figure halved, with patients remaining with, on average, 0.6 decayed teeth. Although there was a dramatic reduction in the status of decayed teeth within this group, there were still adults with unmet dental needs (see Table 3.22). This could potentially be a reflection of those patients who failed to attend appointments and complete their treatment plans, or perhaps even a reflection of differences between examiners. Missing and filled teeth components also increased slightly after the receipt of treatment, with the average number of missing and filled teeth increasing by 0.13 and 0.41 respectively.

Table 3.22: Decayed, missing and filled teeth before and after treatment at baseline for the general sample

	AT BASELINE† (*n*=451)		POST-BASELINE‡ (*n*=451)		
Variables	**Mean#**	**SD**	**Mean#**	**SD**	**Sig.**
D_3 crowns (D+R)	1.100	2.209	0.561	1.230	***
M crowns (E+M)	6.907	5.585	7.035	5.677	*
F crowns (F+Fu)	8.494	5.844	9.348	5.765	***
D_1 and D_3 crowns (D_1+D+R)	1.186	2.436	0.632	1.487	***
D_1 crowns	0.086	0.730	0.071	0.663	*
D_3MFT (D_3+M+F)	16.501	7.867	16.945	7.831	***
D_1D_3MFT (D_1+D_3+M+F)	16.588	7.860	17.016	7.819	***

† Before treatment was provided
‡ After treatment was provided
# The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).
*** (P<0.001), * (P<0.05); Paired samples t-test

3.5.7.3 Caries experience indices

The ratios of decayed, missing and filled teeth to the total count of decayed, missing and filled teeth serve as useful indicators of how well a patient's dental needs are being met. This is presented in Table 3.23 and Table 3.24 as the mean of an individual patient's D_3/D_3MFT index, M/D_3MFT index, and F/D_3MFT index for the emergency and general baseline samples respectively. In the emergency baseline sample, the percentage of present caries experience represented as untreated decay (D_3/D_3MFT) declined only slightly after baseline treatment was provided. The percentage of missing teeth (i.e., M/D_3MFT index) increased after baseline treatment was provided, as did the percentage of filled teeth (i.e., F/ D_3MFT index). The same trend was observed in the general baseline sample, although there was a greater reduction in the D_3/D_3MFT index after treatment was provided.

Table 3.23: Emergency baseline sample – caries experience indices at baseline and after the receipt of baseline treatment

	AT BASELINE† (*n*=401)		POST-BASELINE‡ (*n*=401)		
Variables	**Mean index**	**SD**	**Mean index**	**SD**	
D_3 crowns (D+R) / D_3MFT	0.118	0.196	0.094	0.167	↓ ***
M crowns (E+M) / D_3MFT	0.416	0.237	0.438	0.234	↑ ***
F crowns (F+Fu) / D_3MFT	0.467	0.236	0.474	0.231	↑ **

† Before treatment was provided
‡ After treatment was provided
*** (P<0.001), * (P<0.01); Paired samples t-test

Table 3.24: General baseline sample – caries experience indices at baseline and after the receipt of baseline treatment

Variables	AT BASELINE† (*n*=440) Mean	SD	POST-BASELINE‡ (*n*=440) Mean	SD	
D_3 crowns (D+R) / D_3MFT	0.081	0.155	0.042	0.093	↓ ***
M crowns (E+M) / D_3MFT	0.414	0.240	0.420	0.242	↑ *
F crowns (F+Fu) / D_3MFT	0.505	0.253	0.552	0.236	↑ ***

† Before treatment was provided
‡ After treatment was provided
*** ($P<0.001$), * ($P<0.05$); Paired samples t-test

A summary of the bivariate associations between the baseline samples and caries experience indices before and after baseline treatment is presented in Table 3.25. Significant relationships are identified, along with the directions of these relationships. Baseline samples differed significantly in terms of the D_3/D_3MFT and F/D_3MFT indices both before baseline treatment and after the receipt of baseline treatment. Before treatment was provided to patients in the emergency and general baseline samples, the D_3/D_3MFT index was significantly higher in the emergency baseline sample compared to the general baseline sample, whereas the F/D_3MFT index was significantly lower for emergency baseline patients than general baseline patients. These associations remained after the baseline treatment was provided.

Table 3.25: Differences between the emergency and general baseline samples in terms of the caries experience indices at baseline and after the receipt of baseline treatment

Variables	AT BASELINE†	POST-BASELINE‡	Reference group#
D_3 crowns (D+R) / D_3MFT	** (↑ for E)	*** (↑ for E)	General baseline sample
M crowns (E+M) / D_3MFT	ns	ns	
F crowns (F+Fu) / D_3MFT	* (↓ for E)	*** (↓ for E)	

† Before treatment was provided
‡ After treatment was provided
# General baseline sample is the comparison group
↑ higher; ↓ lower
E Emergency baseline sample
*** ($P<0.001$), ** ($P<0.01$), * ($P<0.05$); ANOVA
ns not significant

3.5.8 Risk assessment

Following the provision of treatment, dentists were asked to complete a risk assessment on patients attending for care. This assessment covered risk status of future disease (caries and periodontal disease) and judgments on patient's compliance with advice and the type of use of dental services in the future (i.e., for a problem or check-up). These results are presented in Table 3.26.

Risk of future caries and periodontal disease was more predominate among emergency patients than general patients. A greater proportion of emergency patients compared to general patients were judged as being in the moderate- to high-risk category of future caries (57.0% cf. 38.7%) and periodontal disease (62.4% cf. 47.0%). These differences were statistically significant (χ^2 test; P<0.01).

Levels of compliance with preventive dental advice varied significantly between emergency and general dental patients. Emergency patients were less likely be categorised as being in the high compliance group (31.7% cf. 48.6%), although half of the emergency sample was categorised in the moderate compliance group.

Future use of dental services for a check-up was high in both groups, with dentists indicating that 69.8% of emergency patients and 74.4% of general patients were likely to visit the dentist for a check-up in the future.

Table 3.26: Risk of future caries and periodontal disease, the likelihood of compliance with advice and future dental service use by baseline sample status

			Emergency	General	Total
Future risk of caries**	High	*n*	67	22	89
		col%	17.0%	6.4%	12.0%
	Moderate	*n*	158	111	269
		col%	40.0%	32.3%	36.4%
	Low	*n*	170	211	381
		col%	43.0%	61.3%	51.6%
Future risk of periodontal disease**	High	*n*	86	37	123
		col%	22.1%	10.9%	16.9%
	Moderate	*n*	157	122	279
		col%	40.3%	36.1%	38.3%
	Low	*n*	147	179	326
		col%	37.7%	53.0%	44.8%
Likelihood of complying with preventive advice**	High	*n*	126	168	294
		col%	31.7	48.6	39.6
	Moderate	*n*	200	148	348
		col%	50.4	42.8	46.8
	Low	*n*	71	30	101
		col%	17.9	8.7	13.6
Future use of dental care services	Check-up	*n*	278	258	536
		col%	69.8	74.4	71.9
	Problem	*n*	120	89	209
		col%	30.2	25.6	28.1

** (P<0.01); χ^2 test

3.6 Summary

The analyses conducted on this baseline sample indicated that there were distinct differences between emergency and general dental attenders. Although the two groups were quite homogenous with respect to socio-demographic characteristics such as age, sex, country of birth and main language spoken at home, emergency and general dental care patients varied in relation to:

1. Dental visiting behaviours/patterns
   - Compared to general patients, emergency patients were more likely to usually visit for a problem or pain, had a more recent pattern of visiting, were more likely to visit a public dental clinic and also visited the dentist more frequently.
2. Oral health status
   - Compared to general patients, the emergency sample had significantly more decayed and missing teeth, and more filled teeth on average. Patients in the emergency sample also had significantly worse periodontal conditions than those in the general sample.
3. Service provision patterns
   - In comparison to the patients in the general sample, a significantly greater proportion of emergency patients received oral surgery services (27.1% cf. 8.4%) and general/miscellaneous services (13.7% cf. 6.6%), whereas a significantly lower proportion of emergency patients received diagnostic services (92.0% cf. 95.7%), preventive services (11.1% cf. 72.8%), restorative services (49.1% cf. 60.8%) and prosthodontic services (0.7% cf. 4.1%) as part of their CoC.
   - In terms of the mean number of services received per CoC, emergency patients received significantly more oral surgery services and general/miscellaneous services per CoC and fewer diagnostic, preventive, restorative and prosthodontic services per CoC than general patients.

Interestingly, emergency patients had higher levels of decay and more severe periodontal conditions, but they were less likely to receive preventive services and more likely to receive oral surgery services rather than restorations. It was found that emergency visits were more likely among those who reported having very good or good oral health compared to those who considered their oral health to be fair, poor or very poor, despite finding that those who made emergency visits had greater odds of having more decayed teeth and more serious periodontal conditions.

3.7 Discussion

These analyses have shown that differences exist in the use of dental services and in the dental care received by emergency and general dental care seekers. These are most clearly seen in the usual reason for visiting, time since last visit, frequency of visiting, and provision of extractions.

Emergency dental services are still predominantly treatment-focused, despite worldwide support of a preventive philosophy for dental care (Elderton, 2003). Lower percentages of emergency patients were receiving preventive and restorative services and higher percentages were having extraction services. When considered alongside the dental visiting behaviours of emergency care seekers (i.e., they usually visit for a problem/pain and they tend to visit the dentist more frequently), an unfavourable pattern of visiting and service provision emerges. This is most likely a reflection of access problems, such as long waiting lists for general dental care, or possibly even attitudinal factors. As Brennan, Spencer and Slade (1997) suggest, 'extraction of teeth represents an endpoint, and is thought to be reflective of patient and provider attitudes, availability of and access to dental care'.

An interesting result to emerge was the finding that emergency visits were more likely among those who reported having very good or good oral health compared to those who considered their oral health to be fair, poor or very poor. Although this may seem to go against findings which show that emergency dental attenders generally have poorer oral health, one must keep in mind that this is a subjective rating of oral health status. In this study, clinical examinations revealed that emergency patients did have poorer oral health in comparison to general dental attenders. In addition, emergency patients reported visiting the dentist more frequently than general patients. These are interesting findings, as they suggest that people cycling through emergency care may consider their oral health to be good, since each time they visit the dentist they are getting another problem fixed. Perhaps in their mind they feel that this dental attendance is making their oral health better, thus contributing to their positive perception of their overall oral health status.

High demand for emergency care within clinics places pressure on clinics to provide services that are aimed at immediate treatment to relieve the problem rather than maintenance and prevention. A decrease in the demand for emergency care would enable clinics to devote resources to restorative and preventive care, which would lead to improvements in the oral health of adult cardholders. This can only be achieved through better understanding the behaviours of emergency and general care seekers and identifying and changing barriers to dental care (whether they are cultural and/or system barriers), and through improving equity of access and by providing appropriate dental treatment to public dental patients. Brennan, Spencer and Slade (1997) reported similar service provision patterns among public dental patients and also supported the need to reduce barriers and ensure more equitable access to appropriate dental services.

After the receipt of baseline treatment, there was still unmet dental need within both the emergency and general samples. Therefore it is anticipated that some people will return for public dental care, provided of course that they remain eligible to receive it. What remains to be determined, however, is the type/nature of care they will return for and the pattern of dental attendance behaviour they will engage in – will they be attending for emergency dental care, general dental care or some combination of the two? Given the way dental care is rationed within the public dental system, general dental care attendance will strongly depend upon whether or not these patients are on a waiting list to receive general dental care. At the time of the baseline study, emergency patients could possibly have been on a waiting list, or may have even requested to be placed on it at the time of their baseline care, but general dental care patients had to be new to the waiting list. General dental care patients therefore may have placed their name on a waiting list after their baseline care. The baseline sample will be followed for a long enough period (>3 years) which will see them come off a waiting list if their name was placed on one. Again, this will depend on whether they are still eligible to receive care when their name comes to the top of the list. The following chapter will detail the results of the longitudinal follow-up and classify patients' dental attendance behaviour according to the nature of the course(s) of care they receive.

The following chapter will essentially examine the longer-term behaviour of the study's baseline participants. It is difficult to plan or understand the future without a complete and accurate picture of the current situation, and so the main purpose of the next chapter was to examine the relative capacity/ability of the public dental system to provide public dental services to eligible adults so as to anticipate the potential behaviour of persons' accessing public dental care.

4 Dental visiting behaviour

4.1 Introduction

Manski, Moeller and Maas (2001) recognise that utilisation studies serve as an important tool for oral health policy decision-making. There are many studies that examine utilisation patterns over a certain survey period, but very few that focus on changing utilisation patterns over time. Longitudinal patterns of dental service use would provide a more detailed analysis of access problems and inequalities in health care.

Whilst data on use of services is important, it is also important to document what types of treatments or procedures people receive when they do visit the dentist. This would enable the identification of any inequities in the utilisation of dental services, and also any inequities in access to particular types of dental services.

Thus, this component of the thesis examines longitudinal patterns of dental attendance and service use among the baseline sample in order to determine dental visiting behaviour. As distinct differences were found between the emergency and general baseline samples (see Section 3), the emergency and general baseline samples are examined separately so that dental visiting patterns and service provision among each of the groups can be observed independently.

Detailed data on service provision amongst the baseline sample were therefore collected. Baseline participants were followed for up to 3½ years after recruitment to the baseline study. Information pertaining to dental visits and treatment received at those visits was extracted from the EXACT MIS in the South Australian Dental Service. Use of treatment records to document attendance behaviour avoids the use of self-reported data that rely on the subject's memory and may be distorted by the pressure to give a socially acceptable answer. Nuttall and Davies (1991, 1992) found large discrepancies between self-reported and actual attendance.

4.2 Aim

The main aims of this component of this thesis were:

1. To determine visiting behaviour of baseline participants based on pattern of attendance during the follow-up period

2. To classify each baseline participant as either
   - an emergency attender
   - a general attender, or
   - both an emergency and general attender

Specifically, the main aim of this component was to identify the recidivist emergency attender. By following baseline participants, the possibility of mislabeling a patient as an 'Emergency attender' or 'General attender' based on their once-off baseline course of care would be eliminated as their actual visiting behaviour over time would become evident. By following the baseline sample, transitions of dental-care seekers from emergency to general dental care, and from general to emergency dental care, could also be examined.

4.3 Data extraction

Recruitment of subjects for the baseline study commenced from June 1999 and subjects were followed up until 31 December 2002 (inclusive), representing a follow-up period of up to 3½ years. Data extracted for both the emergency and general baseline samples are detailed in Table 4.1.

Of the 427 and 471 emergency and general dental care participants at baseline, a total of 96.7% and 91.5% were followed respectively. Locating contact and treatment details for all baseline participants in the EXACT MIS database proved to be a challenge, with not all participants appearing in the system. Information including their name, date of birth and the clinic they attended during the baseline study was used to identify baseline participants in the EXACT MIS, but still not everyone could be found. Despite not being able to extract details for everyone, the proportion of people followed was still high and represented the vast majority of baseline subjects.

Table 4.1: **Data extracted from SADS EXACT MIS (followed from baseline date to 31-Dec-02)**

Sample	Emergency sample n	Emergency sample Percent followed	General sample n	General sample Percent followed
Follow-up	413	96.7	431	91.5
Baseline sample	427		471	

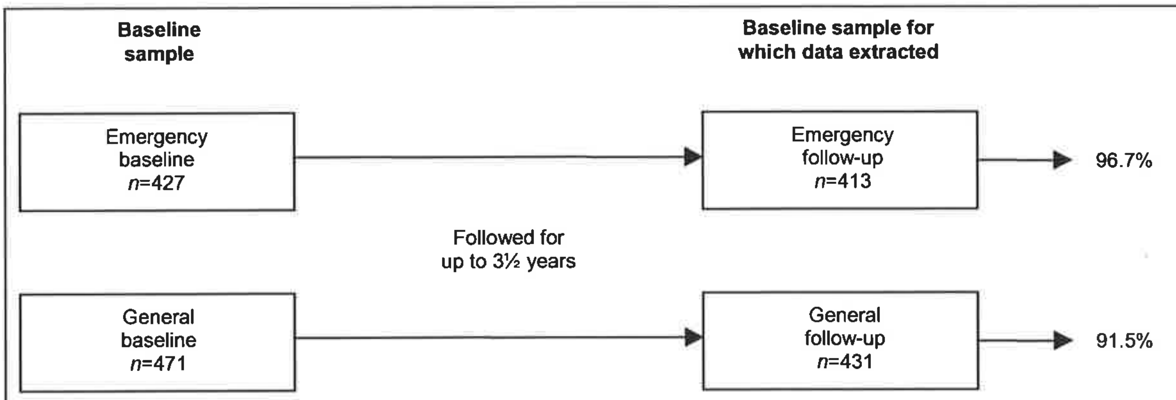


Figure 4.1: **Data extracted from SADS EXACT MIS (followed from baseline date to 31 December 2002)**

4.4 Results

The results will be presented in three sections. The first section will examine longitudinal patterns of dental service use among the emergency baseline sample, and the second section will report longitudinal dental service use patterns among the general baseline sample. The third section will collate these results and make comparisons between the two baseline samples.

4.4.1 Emergency baseline sample

4.4.1.1 Disease experience among the follow-up sample

The disease experience (given by the average number of decayed, missing and filled teeth) at the beginning of the follow-up period by dental attendance post-baseline for patients in the emergency baseline sample is presented in Table 4.2. Within the sample, findings revealed some differences in disease experience among those who did and did not return. Those in the emergency baseline sample who returned had fewer decayed teeth (1.35 D_3

teeth cf. 1.57 D_3 teeth) but significantly more missing (9.04 M teeth cf. 7.25 M teeth) and filled teeth (9.67 F teeth cf. 6.26 F teeth) than those in the emergency baseline sample who did not return.

Table 4.2: Disease experience at the beginning of the follow-up period by dental attendance post-baseline among the emergency baseline sample

	RETURNED POST-BASELINE					
	Yes (n=278)		No (n=116)		Total (n=394)	
Variables‡	Mean†	SD	Mean†	SD	Mean†	SD
D_3 crowns (D+R)	1.345	2.530	1.569	2.534	1.411	2.530
M crowns (E+M)*	9.043	6.091	7.250	6.785	8.515	6.348
F crowns (F+Fu)***	9.669	5.503	6.259	4.985	8.665	5.571
D_1 and D_3 crowns (D_1+D+R)	1.378	2.543	1.819	2.812	1.508	2.629
D_1 crowns***	0.032	0.197	0.250	0.843	0.096	0.495
D_3MFT (D_3+M+F)***	20.058	6.713	15.078	8.251	18.591	7.540
D_1D_3MFT (D_1+D_3+M+F)***	20.090	6.716	15.328	8.078	18.688	7.457

‡ D, M, F teeth after the receipt of baseline treatment

† The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).

***(P<0.001), *(P<0.05); ANOVA

4.4.1.2 Follow-up period

The time interval for which patients were followed varied because patients were recruited at different points of time for the baseline study. Consequently the follow-up period ranged between 2.24 years and 3.51 years, as detailed in Table 4.3. Across the total sample, patients were followed for an average of 2.8 years.

Table 4.3: Follow-up period in years from baseline date† to 31 December 2002

	n	Min	Max	Mean	SD
Follow-up years	413	2.24	3.51	2.846	0.461

† Recruitment of baseline participants commenced from June 1999

4.4.1.3 Dental visiting (post-baseline study)

The proportion of emergency patients who returned for dental care following their baseline emergency CoC is presented in Table 4.4. As shown in Table 4.4, of those patients receiving an emergency course of care at baseline, 70.7% returned for subsequent treatment.

Table 4.4: Proportion of emergency baseline subjects returning for treatment post-baseline

Returned post-baseline	*n*	Percent
No	121	29.3
Yes	292	70.7
Total	413	100.0

Displayed in Table 4.5 is the age by sex distribution by those who returned and those who did not return for dental care following their baseline CoC. Those who did not return were significantly younger than those who returned post-baseline. Some 52.1% of those who did not return were aged between 25 and 44 years, compared to 28.1% of those who did return. Almost 70% of those who returned were aged 45 years or more, compared to just under 40% of 45+ year-olds who did not return.

Table 4.5: Age by sex distribution of emergency patients by dental attendance post-baseline

Returned post-baseline*	Age group†	Sex‡ (col%) Male	Female	Total
		n=53	*n*=68	*n*=121
No	18–24 years	7.5	8.8	8.3
	25–44 years	49.1	54.4	52.1
	45–64 years	24.5	26.5	25.6
	65+ years	18.9	10.3	14.0
		n=120	*n*=172	*n*=292
Yes	18–24 years	2.5	2.3	2.4
	25–44 years	21.7	32.6	28.1
	45–64 years	35.0	35.5	35.3
	65+ years	40.8	29.7	34.2

† (Age group x Sex) interaction not significant
‡ (Sex x Returned) interaction not significant
* (Age group x Returned) P<0.001; χ^2 test

Table 4.6 presents the number of years the emergency baseline sample was followed broken down by those who returned for subsequent treatment and those who did not return. There were significant differences in the average follow-up times for those that returned and those that did not. Those that returned were followed for a slightly longer period (1.4 months or 0.116 years).

Table 4.6: Follow-up period in years by those who returned

Returned post-baseline*	*n*	Min	Max	Mean	SD
No	121	2.24	3.51	2.764	0.463
Yes	292	2.24	3.50	2.880	0.457

* (P<0.05); ANOVA

Table 4.7 presents the proportion of patients by the time taken for them to return after their emergency baseline course of care. Almost three-quarters of the sample that returned for dental care returned within 12 months of the baseline study, with almost one quarter returning in the first month, approximately 30% between 1 and 6 months and 20% between 7 and 12 months.

Table 4.7: Proportion of emergency baseline patients who returned for care post-baseline by the time taken to return for the first post-baseline CoC

Time taken to first return	*n*	Percent	Cumulative percent
<1 month	68	23.3	23.3
1–<3 months	39	13.4	36.6
3–<6 months	46	15.8	52.4
7–<12 months	59	20.2	**72.6**
12–<18 months	35	12.0	84.6
18–<24 months	21	7.2	91.8
24+ months	24	8.2	100.0
Total	292	100.0	

Table 4.8 shows the distribution of persons in the sample by the nature of the first CoC received post-baseline. Based on patients' clinical attendance records, CoC type was categorised as either an Emergency or General based on the course of care description code on the MIS system. Those CoC that did not obviously fall into either of these categories were initially classified as Other. Examination of the services provided under this CoC later in this chapter may shed some light as to what an Other CoC may represent. In some instances the nature of the CoC was unable to be determined and so it was classified as Unknown. Fortunately this was only the case for a small number of patients (n=4 in this case). Of those that returned, 75% returned for another emergency course of care, whilst a further 19% received a general course of care as their first course of care post-baseline.

Table 4.8: **Proportion of persons in the emergency baseline sample by the type of first post-baseline CoC**

First post-baseline COC type	*n*	Percent
Emergency	219	**75.0**
General	55	18.8
Other‡	14	4.8
Unknown	4	1.4
Total	292	100.0

‡ Other CoC type will be examined in terms of its service mix in later sections to determine whether it can be categorised as an emergency or general CoC.

Table 4.9 presents the proportion of patients who received an emergency, general or other CoC as their first baseline CoC by the time taken for them to return for this first post-baseline CoC. Within each return interval, a greater proportion of patients received emergency care as their first post-baseline course of care (see Table 4.9).

Table 4.9: **Proportion of emergency baseline patients who received emergency, general or other care as their first post-baseline CoC by the time taken to return for this first post-baseline CoC**

Time taken to first return	*n*	First post-baseline COC type (row%)			
		Emergency	General	Other	Unknown
<1 month	68	61.8	26.5	8.8	2.9
1–<3 months	39	74.4	17.9	7.7	–
3–<6 months	46	80.4	13.0	4.3	2.2
7–<12 months	59	83.1	11.9	3.4	1.7
12–<18 months	35	88.6	11.4	–	–
18–<24 months	21	76.2	19.0	4.8	–
24+ months	24	62.5	37.5	–	–
Total	292	75.0	18.8	4.8	1.4

Table 4.10 details the proportion of patients returning within a certain time interval for their first post-baseline CoC by the type of first baseline CoC they received. Almost 72% of patients receiving emergency care as their first post-baseline course of care returned within 12 months of their baseline treatment, and 69% of patients receiving general care as their first post-baseline course of care received that care within 12 months of their emergency baseline treatment (see Table 4.10).

Table 4.10: Proportion of emergency baseline patients returning within a certain time interval for their first post-baseline CoC by the type of first post-baseline CoC received

Time taken to first return	First post-baseline COC type (col%) Emergency	General	Other	Unknown	Total
	n=219	n=55	n=14	n=4	n=292
<1 month	19.2	32.7	42.9	50.0	23.3
1–<3 months	13.2	12.7	21.4	–	13.4
3–<6 months	16.9	10.9	14.3	25.0	15.8
7–<12 months	22.4	12.7	14.3	25.0	20.2
12–<18 months	14.2	7.3	–	–	12.0
18–<24 months	7.3	7.3	7.1	–	7.2
24+ months	6.8	16.4	–	–	8.2

Table 4.11 presents the number of courses of care patients received during the follow-up period. Just over 29% of the emergency baseline sample did not have any courses of care after baseline, while 21.5%, 15.5%, 11.9%, 9.4%, 3.1% and 9.2% had one, two, three, four, five or six or more courses of care respectively.

Table 4.11: Distribution of the number of CoC received during the follow-up period

Number of post-baseline CoC	*n*	Percent
0 CoC	121	29.3
1 CoC	89	21.5
2 CoC	64	15.5
3 CoC	49	11.9
4 CoC	39	9.4
5 CoC	13	3.1
6+ CoC	38	9.2
Total	413	100.0

Table 4.12 presents the distribution of post-baseline CoC types for those that returned and across the total sample. Of those that returned after baseline, 89.4% received one or more emergency courses of care and 42.5% received one or more general courses of care. The post-baseline CoC type groups presented in Table 4.12 are *not* mutually exclusive.

Table 4.12: Distribution of post-baseline CoC types for those that returned and across the total sample

Post-baseline CoC type	Frequency	Returned (*n*=292)	All (*n*=413)
Emergency	261	89.4	63.2
General	124	42.5	30.0
Other	26	8.9	6.3
Unknown	5	1.7	1.2

Table 4.13 presents the average time between the emergency baseline CoC and the first emergency CoC and general CoC received post-baseline. On average, emergency baseline patients returned for another emergency CoC within 8.6 months of their baseline emergency CoC. For those receiving a general CoC post-baseline, the average time between the baseline emergency CoC and the first general CoC received post-baseline was 19.0 months.

Table 4.13: Average time in months between the emergency baseline CoC and the first emergency and general post-baseline CoC

Post-baseline CoC type		Average time between baseline CoC and first post-baseline CoC (months)
		(*n*=261)
Emergency	Mean	8.587
	SD	8.996
	Min	0.033
	Max	39.978
		(*n*=124)
General	Mean	19.016
	SD	12.540
	Min	0.197
	Max	40.603

Table 4.14 shows the proportion of patients broken down by the number of courses of care they received during the follow-up and the type of post-baseline CoC they received. Almost 37% of the sample followed did not receive any emergency care after baseline, whilst 23.5%, 13.8%, 11.4%, 5.3%, 1.9% and 7.3% received one, two, three, four, five or six or more courses of emergency care respectively. Some 70% of the sample followed did not receive any general care after baseline, whilst 26.2%, 2.9%, 0.7% and 0.2% received one, two, three or four courses of care respectively. Overall, 63.2% received some quantity of emergency care and 30% of persons followed received some general care after baseline.

Table 4.14: Distribution of the number of CoC received during the follow-up period by the post-baseline CoC type

Post-baseline CoC type	Number of post-baseline CoC (total *n*=413) 0 CoC	1 CoC	2 CoC	3 CoC	4 CoC	5 CoC	6+ CoC	
	n=152	*n*=97	*n*=57	*n*=47	*n*=22	*n*=8	*n*=30	
Emergency	36.8	23.5	13.8	11.4	5.3	1.9	7.3	=63.2%
	n=289	*n*=108	*n*=12	*n*=3	*n*=1	*n*=0	*n*=0	
General	70.0	26.2	2.9	0.7	0.2	–	–	=30.0%
	n=387	*n*=19	*n*=6	*n*=0	*n*=1	*n*=0	*n*=0	
Other	93.7	4.6	1.5	–	0.2	–	–	=6.3%
	n=408	*n*=3	*n*=1	*n*=0	*n*=1	*n*=0	*n*=0	
Unknown	98.8	0.7	0.2	–	0.2	–	–	=1.2%
	n=121	*n*=89	*n*=64	*n*=49	*n*=39	*n*=13	*n*=38	
All CoC types	29.3	21.5	15.5	11.9	9.4	3.1	9.2	=70.6%

Table 4.15 shows the average time between courses of care for those returning after baseline irrespective of the type of care sought. For those having one course of care post-baseline, they returned for care on average 12.9 months later. For those having 2 post-baseline courses of care, the average time between courses of care was 9.4 months. As expected, the average time between courses of care decreased as the number of courses of care received increased. Across the sample of those who returned, the average time between courses of care was 8.9 months.

Table 4.15: Average time in months between the numbers of courses of care received post-baseline across all post-baseline CoC types

All post-baseline CoC types		Average time between CoC (months) — Number of post-baseline CoC: 1 CoC[a] (*n*=89)	2 CoC[b] (*n*=64)	3 CoC (*n*=49)	4 CoC (*n*=39)	5 CoC (*n*=13)	6+ CoC (*n*=38)	Total (*n*=292)
Total†*	Mean	12.88	9.45	8.07	6.30	5.32	3.70	8.91
	SD	10.15	5.36	2.83	2.04	1.91	1.39	7.05
	Min	0.07	0.81	1.97	2.41	1.64	0.99	0.07
	Max	36.99	20.09	13.67	9.88	7.67	6.60	36.99

* (P<0.0001); ANOVA
† for all CoC types
a time between baseline CoC & first post-baseline CoC
b time between baseline CoC & first post-baseline CoC and first & second post-baseline CoC. The same logic applies for those who had 3 CoC, 4 CoC 5 CoC and 6+ CoC

Table 4.16 shows the frequency of visiting, broken down by number of courses of care received during follow-up and post-baseline CoC type. For those who had only one emergency course of care after baseline, they returned, on average, 12.4 months later for that CoC. For those returning for only one general CoC post-baseline, the average time between the emergency baseline CoC and that general CoC was 20.21 months (or 1.68

years). Overall, there was an average time period of 9.1 months between emergency courses of care and 7.5 months between general courses of care.

Table 4.16: Average time interval in months between the numbers of CoC received post-baseline by the nature of the post-baseline course of care

Post-baseline CoC type		Average time between CoC (months)							
		Number of post-baseline CoC							
		1 CoC[a]	2 CoC[b]	Total	4 CoC	5 CoC	6+ CoC	Total	
		(*n*=97)	(*n*=57)	(*n*=261)	(*n*=22)	(*n*=8)	(*n*=30)	(*n*=261)	
Emergency*	Mean	12.37	8.98	9.07	5.99	5.60	3.85	9.07	
	SD	10.70	4.69	7.60	1.96	1.66	1.50	7.60	
	Min	0.07	0.61	0.07	3.45	2.85	1.47	0.07	
	Max	39.98	18.99	39.98	9.58	8.00	6.61	39.98	
		(*n*=108)	(*n*=12)	(*n*=3)	(*n*=1)	(*n*=0)	(*n*=0)	(*n*=16)	(*n*=124)
General	Mean	20.21‡	7.44	8.00	6.51	–	–	7.49†	18.57¥
	SD	12.43	9.03	4.10	.			7.88	12.66
	Min	0.20	0.03	3.86	6.51			0.03	0.03
	Max	40.60	27.48	12.07	6.51			27.48	40.60

* ($P<0.0001$); ANOVA

a time between baseline emergency CoC & post-baseline CoC for those who returned for only 1 CoC during the follow-up period

b time between baseline CoC & first post-baseline CoC and first & second post-baseline CoC for those who returned for 2 CoC during the follow-up period. The same logic applies for those who had 3 CoC, 4 CoC 5 CoC and 6+ CoC

‡ this mean represents the average time interval (in months) between the emergency baseline CoC and the first post-baseline general CoC for those who only had 1 general CoC post-baseline

† this average time interval represents the average time between general CoC only and so excludes the average time interval between the emergency baseline CoC and the first post-baseline general CoC

¥ this average time interval includes the average time interval between the emergency baseline CoC and the first post-baseline general CoC and subsequent general CoC

Table 4.17 presents the mean number of visits and CoC per follow-up year within each post-baseline CoC type. Visits per follow-up year were calculated by dividing the total number of visits made by the patient for each particular CoC type by the number of years followed. Similarly, CoC per follow-up year was calculated by dividing the total number of post-baseline CoC received by the patient for each particular CoC type by the number of years followed.

Across all post-baseline CoC types for those that returned, baseline participants were making, on average, 1.56 visits per follow-up year to the dentist. Those receiving emergency CoC post-baseline were making 1.07 visits per follow-up year for emergency care, and those receiving general CoC post-baseline were visiting the dentist, on average, 1.27 times per follow-up year.

The average number of courses of care per follow-up year for those that returned was 1.07. Those receiving emergency CoC post-baseline were having an average of 0.94

emergency courses of care per follow-up year, whilst those returning for general CoC were having an average of 0.40 general courses of care per follow-up year.

Table 4.17: Mean number of visits and CoC per follow-up year by post-baseline CoC type

		Post-baseline CoC type				Totals	
		Emergency (*n*=261)	General (*n*=124)	Other (*n*=26)	Unknown (*n*=5)	Returned (*n*=292)	All (*n*=413)
Visits per follow-up years	Mean	1.07	1.27	0.59	0.66	1.56	1.10
	SD	0.92	1.21	0.34	0.46	1.42	1.39
	Min	0.29	0.29	0.29	0.30	0.29	0.00
	Max	7.06	10.85	1.44	1.18	12.01	12.01
CoC per follow-up years	Mean	0.94	0.40	0.49	0.55	1.07	0.75
	SD	0.71	0.16	0.28	0.37	0.81	0.83
	Min	0.29	0.29	0.29	0.30	0.29	0.00
	Max	4.48	1.18	1.44	1.18	5.08	5.08

4.4.1.4 Service provision

The following section examines the proportion of persons in the emergency baseline sample receiving particular types of services during the follow-up period and, since the follow-up period for patients within the sample varied, the rate of services per year was also calculated. The rate of services per year was calculated by dividing the total number of services received by the number of years followed. The variables in the following analyses represent the main areas of service which follow the ADA Schedule of Dental Services (1992). Specific service items were initially collected and were subsequently aggregated into one of ten main areas of service over the follow-up period.

Distribution of services

Table 4.18 shows the percentage of patients who had at least one service from the main service areas. There was a large difference in the percentage of patients receiving preventive services, depending on course of care type. Significantly fewer persons received preventive services if they attended for an emergency dental care compared to those who attended for general dental care. Significantly more people returning for emergency care received oral surgery services compared to those having general care. In addition, a significantly greater proportion of persons attending for emergency care were receiving general/miscellaneous services compared to those attending for general dental care.

Table 4.18: Distribution of services by post-baseline CoC type

Main service area	Post-baseline CoC type Emergency (*n*=183)	General (*n*=47)	Other (*n*=12)	Unknown (*n*=11)	Totals Returned (*n*=292)	All (*n*=413)
Diagnostic services	94.6	91.1	100.0	–	95.2	67.3
Preventive services†*	18.8	54.8	7.7	–	37.3	26.4
Periodontic services	3.1	2.4	–	–	3.8	2.7
Oral surgery services†*	42.5	16.9	–	–	41.4	29.3
Endodontic services	17.2	16.1	7.7	–	20.2	14.3
Restorative services	66.7	64.5	7.7	–	72.9	51.6
Crown and bridge services	2.3	2.4	–	–	2.1	1.5
Prosthodontic services	10.7	15.3	–	40.0	14.0	9.9
Orthodontic services	–	–	–	–	–	–
General/misc. services†*	28.7	12.9	–	60.0	30.1	21.3

† Significant difference between Emergency and General post-baseline CoC types in terms of the proportion receiving particular service types: * (P<0.001); χ^2 test

Table 4.19 shows the mean number of services per follow-up year by the main area of service for various post-baseline CoC types. Distributions reflect both the volume of services provided in different service areas, and the degree of variation in service provision between different CoC types. Mean service rates showed that, for people returning for emergency dental care, diagnostic, oral surgery and restorative services dominated the distribution of services, while preventive, periodontic and prosthodontic services were provided at low rates for those receiving emergency dental care. For those receiving a general course of care, diagnostic, preventive and restorative services were provided at higher rates.

Table 4.19: **Mean number of services per follow-up year by main area of service and post-baseline CoC type**

Main service area		Post-baseline CoC type Emergency (*n*=261)	General (*n*=124)	Other (*n*=26)	Unknown (*n*=5)	Totals Returned (*n*=292)	All (*n*=413)
Diagnostic	Mean	1.22	0.86	0.60	0.00	1.51	1.07
	SD	1.01	0.82	0.37	0.00	1.25	1.26
	Min	0.00	0.00	0.29	0.00	0.00	0.00
	Max	6.05	6.20	1.45	0.00	8.35	8.35
Preventive	Mean	0.08	0.27	0.06	0.00	0.19	0.13
	SD	0.18	0.31	0.21	0.00	0.31	0.27
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	0.95	1.69	0.86	0.00	2.03	2.03
Periodontic	Mean	0.01	0.01	0.00	0.00	0.01	0.01
	SD	0.06	0.05	0.00	0.00	0.07	0.06
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	0.44	0.32	0.00	0.00	0.44	0.44
Oral surgery	Mean	0.31	0.24	0.00	0.00	0.38	0.27
	SD	0.58	0.95	0.00	0.00	0.83	0.72
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	4.91	7.38	0.00	0.00	7.38	7.38
Endodontic	Mean	0.11	0.22	0.03	0.00	0.20	0.14
	SD	0.40	0.70	0.13	0.00	0.63	0.54
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	4.61	5.81	0.58	0.00	6.20	6.20
Restorative	Mean	0.77	1.06	0.04	0.00	1.14	0.81
	SD	1.01	1.47	0.13	0.00	1.50	1.37
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	5.62	9.69	0.63	0.00	10.30	10.30
Crown/bridge	Mean	0.02	0.03	0.00	0.00	0.03	0.02
	SD	0.17	0.21	0.00	0.00	0.27	0.23
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	2.63	2.02	0.00	0.00	3.79	3.79
Prosthodontic	Mean	0.08	0.19	0.00	0.47	0.16	0.11
	SD	0.28	0.57	0.00	0.64	0.54	0.46
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	2.24	3.44	0.00	1.18	4.92	4.92
Orthodontic	Mean	0.00	0.00	0.00	0.00	0.00	0.00
	SD	0.00	0.00	0.00	0.00	0.00	0.00
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	0.00	0.00	0.00	0.00	0.00	0.00
General/misc.	Mean	0.15	0.08	0.00	0.20	0.17	0.12
	SD	0.32	0.28	0.00	0.18	0.37	0.32
	Min	0.00	0.00	0.00	0.00	0.00	0.00
	Max	2.99	2.32	0.00	0.34	3.29	3.29
Total	Mean	2.76	2.95	0.73	0.66	3.79	2.68
	SD	2.31	2.89	0.62	0.46	3.36	3.31
	Min	0.29	0.29	0.29	0.30	0.29	0.00
	Max	16.13	24.41	2.53	1.18	27.90	27.90

Table 4.20 shows the distribution of services in the main service areas by the number of courses of care received during the follow-up period for those attending for emergency dental care. A significant increase in the mean service rate across increasing numbers of courses of care was observed for diagnostic, preventive, periodontic, endodontic and restorative services. For each of these main service areas, as the number of emergency courses of care received increased, diagnostic services increased just over six-fold, preventive services increased just over two-fold, periodontic services increased three-fold, endodontic services increased almost fourteen-fold and restorative services increased almost seven-fold. Overall, the mean number of services received increased almost seven-fold as the number of emergency courses of care received increased.

Table 4.20: Those attending for emergency CoC post-baseline: mean number of services per follow-up year for those that returned for emergency care and across the total sample and also by the number of emergency CoC received post-baseline

Main service area		Post-baseline All (*n*=413)	Returned (*n*=261)	Number of post-baseline Emergency CoC* 1 CoC (*n*=97)	2 CoC (*n*=57)	3 CoC (*n*=47)	4 CoC (*n*=22)	5 CoC (*n*=8)	6+ CoC (*n*=30)	
Diagnostic	Mean	0.77	1.22	0.49	0.86	1.52	1.78	2.30	3.08	*
	SD	1.00	1.01	0.31	0.45	0.52	0.60	0.76	1.14	
	Min	0.00	0.00	0.00	0.00	0.60	0.44	1.45	0.59	
	Max	6.05	6.05	1.90	3.28	3.00	3.10	3.62	6.05	
Preventive	Mean	0.05	0.08	0.07	0.04	0.07	0.13	0.09	0.16	*
	SD	0.15	0.18	0.18	0.11	0.18	0.24	0.17	0.23	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	0.95	0.95	0.95	0.41	0.83	0.88	0.42	0.73	
Periodontic	Mean	0.01	0.01	0.00	0.01	0.02	0.02	0.00	0.03	*
	SD	0.05	0.06	0.00	0.07	0.08	0.09	0.00	0.11	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	0.44	0.44	0.00	0.36	0.43	0.44	0.00	0.42	
Oral surgery	Mean	0.20	0.31	0.11	0.27	0.29	0.51	0.81	0.77	
	SD	0.48	0.58	0.21	0.38	0.37	0.78	1.33	1.03	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	4.91	4.91	1.16	1.32	1.27	3.34	3.92	4.91	
Endodontic	Mean	0.07	0.11	0.03	0.07	0.10	0.18	0.25	0.41	*
	SD	0.32	0.40	0.09	0.39	0.21	0.32	0.29	0.88	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	4.61	4.61	0.43	2.92	0.86	0.88	0.69	4.61	
Restorative	Mean	0.49	0.77	0.32	0.65	0.74	1.04	1.38	2.18	*
	SD	0.89	1.01	0.63	0.52	0.70	0.71	1.02	1.75	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	
	Max	5.62	5.62	4.71	2.07	2.97	2.20	3.25	5.62	
Crown/bridge	Mean	0.01	0.02	0.01	0.00	0.06	0.02	0.00	0.03	
	SD	0.14	0.17	0.07	0.00	0.38	0.07	0.00	0.13	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	2.63	2.63	0.64	0.00	2.63	0.34	0.00	0.62	
Prosthodontic	Mean	0.05	0.08	0.03	0.07	0.02	0.35	0.17	0.14	*
	SD	0.23	0.28	0.14	0.20	0.10	0.65	0.48	0.32	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	2.24	2.24	0.88	0.88	0.57	2.24	1.37	1.44	
Orthodontic	Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	SD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
General/misc.	Mean	0.10	0.15	0.05	0.11	0.18	0.11	0.23	0.55	*
	SD	0.26	0.32	0.14	0.23	0.26	0.23	0.27	0.60	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	2.99	2.99	0.85	1.25	1.25	0.72	0.69	2.99	
Total	Mean	1.74	2.76	1.11	2.07	3.00	4.13	5.22	7.35	*
	SD	2.27	2.31	0.69	1.01	0.90	1.02	1.61	2.60	
	Min	0.00	0.29	0.29	0.57	0.91	2.63	2.90	2.65	
	Max	16.13	16.13	5.39	8.02	5.10	6.16	7.85	16.13	

* ($P<0.05$); ANOVA

Table 4.21 shows the distribution of services in the main service areas by the number of courses of care received during the follow-up period for those attending for general dental care. Mean services rates varied across the number of general courses of care received with significant differences observed for diagnostic, periodontic, restorative, crown and bridge and prosthodontic services However, there was no obvious linear trend in mean service rates across increasing numbers of general courses of care for these service areas.

Table 4.21: Those attending for general CoC post-baseline: mean number of services per follow-up year for those that returned for general care and across the total sample and also by the number of general CoC received post-baseline

Main service area		Post-baseline All (*n*=413)	Post-baseline Returned (*n*=124)	Number of post-baseline General CoC 1 CoC (*n*=108)	2 CoC (*n*=12)	3 CoC (*n*=3)	4 CoC (*n*=1)	
Diagnostic	Mean	0.26	0.86	0.79	1.23	1.72	1.47	*
	SD	0.60	0.82	0.78	0.96	1.25	.	
	Min	0.00	0.00	0.00	0.29	0.29	1.47	
	Max	6.20	6.20	6.20	3.77	2.58	1.47	
Preventive	Mean	0.08	0.27	0.26	0.40	0.10	0.59	
	SD	0.21	0.31	0.29	0.50	0.17	.	
	Min	0.00	0.00	0.00	0.00	0.00	0.59	
	Max	1.69	1.69	1.26	1.69	0.29	0.59	
Periodontic	Mean	0.002	0.01	0.00	0.00	0.19	0.00	*
	SD	0.03	0.05	0.03	0.00	0.17	.	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	0.32	0.32	0.32	0.00	0.29	0.00	
Oral surgery	Mean	0.07	0.24	0.26	0.13	0.00	0.00	
	SD	0.53	0.95	1.01	0.27	0.00	.	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	7.38	7.38	7.38	0.84	0.00	0.00	
Endodontic	Mean	0.07	0.22	0.20	0.31	0.67	0.00	
	SD	0.39	0.70	0.71	0.57	0.92	.	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	5.81	5.81	5.81	1.74	1.72	0.00	
Restorative	Mean	0.32	1.06	0.99	1.34	0.58	5.89	*
	SD	0.94	1.47	1.46	1.11	0.29	.	
	Min	0.00	0.00	0.00	0.00	0.29	5.89	
	Max	9.69	9.69	9.69	3.55	0.86	5.89	
Crown/bridge	Mean	0.01	0.03	0.02	0.00	0.39	0.00	*
	SD	0.12	0.21	0.20	0.00	0.67	.	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	2.02	2.02	2.02	0.00	1.17	0.00	
Prosthodontic	Mean	0.06	0.19	0.14	0.60	0.39	0.00	*
	SD	0.32	0.57	0.49	1.02	0.67	.	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	3.44	3.44	2.68	3.44	1.17	0.00	
Orthodontic	Mean	–	0.00	0.00	0.00	0.00	0.00	
	SD	0.00	0.00	0.00	0.00	0.00	.	
	Min	0.00	0.00	0.00	0.00	0.00	0.00	
	Max	0.00	0.00	0.00	0.00	0.00	0.00	
General/misc.	Mean	0.02	0.08	0.07	0.10	0.10	0.29	
	SD	0.16	0.28	0.30	0.18	0.17	.	
	Min	0.00	0.00	0.00	0.00	0.00	0.29	
	Max	2.32	2.32	2.32	0.44	0.29	0.29	
Total	Mean	0.89	2.95	2.74	4.10	4.13	8.24	
	SD	2.08	2.89	2.93	2.17	0.69	.	
	Min	0.00	0.29	0.29	0.59	3.50	8.24	
	Max	24.41	24.41	24.41	8.42	4.87	8.24	

* ($P<0.05$); ANOVA

4.4.1.5 Attendance behaviour patterns

Table 4.22 shows the percentage of people receiving various combinations of course of care types. Just over 52% of persons that returned for care post-baseline received emergency care only, while 9.2% received only general care after baseline. Some 28% of patients returning for care after their baseline care received a combination of emergency and general care during the follow-up period. The next step was to categorise a person's dental visiting behaviour based on their attendance pattern during the follow-up period as shown in Table 4.22. However, for those who did not return, a decision needed to be made as to what kind of dental attender the person was. It was decided that those who did not return would remain unclassified so as to avoid misclassifying them according to their once-off baseline CoC type.

Table 4.22: Distribution of emergency baseline patients according to their dental attendance behaviour during the follow-up period (based on the types of post-baseline CoC received)

Dental attendance during follow-up (based on CoC type)	*n*	Percent	Cumulative percent
Emergency	153	52.4	52.4
General	27	9.2	61.6
Other	1	0.3	62.0
Unknown	1	0.3	62.3
Emergency and General	82	28.1	90.4
Emergency and Other	13	4.5	94.9
General and Other	1	0.3	95.2
Emergency, General and Other	10	3.4	98.6
Emergency, General and Unknown	3	1.0	99.6
General, Other and Unknown	1	0.3	100.0
Total	292	100.0	

If one is to consider the nature of the baseline CoC when classifying a patient as an emergency attender, general attender or some combination of the two, 153 persons end up being classified as an emergency attender (as their emergency care seeking pattern continues post-baseline – see Table 4.22) and 109 are classified as an Emergency and General attender (i.e., subjects initially receive an emergency CoC at baseline and then return for general care or return for both general and emergency dental care post-baseline: 109 represents the sum of 27 General attenders and 82 Emergency and General attenders (as given in Table 4.22)). Note that since these patients initially received an emergency CoC at baseline, and the nature of this baseline CoC is also used to classify the patient's pattern of dental care attendance, their pattern of dental care will always include an emergency CoC and, therefore, they cannot be classified as only having a general dental care pattern of attendance. These classification groups are presented in Table 4.23.

Table 4.23: Behaviour attendance pattern based on baseline CoC and CoC types received post-baseline

Behaviour attendance pattern	*n*	% of total sample (*n*=413)
Emergency	153	37.0
General	NA‡	NA‡
Emergency and General†	109	26.4

† includes those returning for general CoC only and those returning for both
‡ not applicable as these patient's pattern of dental care includes their baseline emergency CoC so they cannot be classified as only having a general dental care pattern of attendance

Table 4.24 presents the proportion of people in the emergency baseline sample receiving various combinations of course of care types post-baseline by the number of CoC they received. Of those receiving emergency care only post-baseline, 39.9% had just the one emergency CoC during the follow-up period, while 22.9% had two emergency CoC, 18.3% had three emergency CoC and the remaining 19% had four or more courses of emergency care. The majority of persons who had only general dental care post-baseline had only the one course of general care (96.3%), and a small proportion (3.7%) had two courses of general care. For those who were classified as an emergency and general attender, 30.5% had two courses of care (i.e., one emergency and one general CoC), 19.5% had three courses of care and the remaining 50.0% had four or more course of care.

Table 4.24: Distribution of emergency baseline patients according to their dental attendance behaviour during the follow-up period by the number of post-baseline CoC

Dental attendance during follow-up (based on CoC type)	*n*	Number of post-baseline CoC (row %) 1 CoC	2 CoC	3 CoC	4 CoC	5 CoC	6+ CoC
Emergency	153	39.9	22.9	18.3	9.2	3.3	6.5
General	27	96.3	3.7	–	–	–	–
Other	1	100.0	–	–	–	–	–
Unknown	1	100.0	–	–	–	–	–
Emergency and General	82	–	30.5	19.5	20.7	9.8	19.5
Emergency and Other	13	–	15.4	30.8	23.1	–	30.8
General and Other	1	–	100.0	–	–	–	–
Emergency, General and Other	10	–	–	10.0	40.0	–	50.0
Emergency, General and Unknown	3	–	–	–	–	–	100.0
General, Other and Unknown	1	–	–	–	100.0	–	0.0
Total	292	30.5	21.9	16.8	13.4	4.5	13.0

4.4.2 General baseline sample

4.4.2.1 Disease experience among the follow-up sample

The disease experience (given by the average number of decayed, missing and filled teeth) at the beginning of the follow-up period by dental attendance post-baseline for the general baseline sample is presented in Table 4.25. Those in the general sample who returned had, on average, slightly more decayed teeth (0.59 D_3 teeth cf. 0.53 D_3 teeth) and more missing teeth (7.65 M teeth cf. 6.74 M teeth) and significantly more filled teeth (10.49 F teeth cf. 8.36 F teeth) than non-returners in the general sample.

Table 4.25: Disease experience at the beginning of the follow-up period by dental attendance post-baseline among the general baseline sample

	RETURNED POST-BASELINE					
	Yes (*n*=195)		No (*n*=192)		Total (*n*=387)	
Variables‡	**Mean†**	**SD**	**Mean†**	**SD**	**Mean†**	**SD**
D_3 crowns (D+R)	0.595	1.294	0.526	1.175	0.561	1.236
M crowns (E+M)	7.651	5.638	6.745	5.585	7.202	5.623
F crowns (F+Fu)***	10.492	5.693	8.365	5.579	9.437	5.729
D_1 and D_3 crowns (D_1+D+R)	0.733	1.794	0.552	1.201	0.643	1.529
D_1 crowns	0.138	0.977	0.026	0.239	0.083	0.715
D_3MFT (D_3+M+F)***	18.738	6.947	15.635	7.823	17.199	7.547
D_1D_3MFT (D_1+D_3+M+F)***	18.877	6.898	15.661	7.811	17.282	7.530

‡ D, M, F teeth after the receipt of baseline treatment

† The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).

***(P<0.001); ANOVA

4.4.2.2 Follow-up period

The follow-up period varied across the general baseline sample as recruitment of patients for the baseline study occurred over a period of 16 months. As patients were recruited at different points in time for the baseline study, the follow-up period for the general baseline sample ranged between 2.24 years and 3.53 years. Across the total sample, patients were followed for an average of 3.0 years (see Table 4.26).

Table 4.26: Follow-up period in years from baseline date† to 31 December 2002

	n	Min	Max	Mean	SD
Follow-up years	431	2.24	3.53	3.008	0.353

† Recruitment of baseline participants commenced from June 1999

4.4.2.3 Dental visiting (post-baseline study)

The proportion of persons in the general baseline sample returning for treatment post-baseline is presented in Table 4.27. Of those patients receiving a general course at baseline, 51.3% returned for subsequent treatment.

Table 4.27: Proportion of general baseline subjects returning for treatment post-baseline

Returned post-baseline	*n*	Percent
No	210	48.7
Yes	221	51.3
Total	431	100.0

Presented in Table 4.28 is the age by sex distribution broken down by those who returned and those who did not return for dental care following their baseline CoC. In the general baseline sample, those who did not return were significantly younger than those who returned post-baseline. Some 47.6% of those who did not return were aged between 25 and 44 years, compared to 31.2% of those who did return. Just over 61% of those who returned were aged 45 years or more compared to just over 45% of 45+ year-olds who did not return.

Table 4.28: Age by sex distribution of general patients by dental attendance post-baseline

Returned post-baseline*	Age group†	Sex‡ (col%) Male	Female	Total
		n=93	*n*=117	*n*=210
No	18–24 years	8.6	6.0	7.1
	25–44 years	47.3	47.9	47.6
	45–64 years	22.6	30.8	27.1
	65+ years	21.5	15.4	18.1
		n=83	*n*=138	*n*=221
Yes	18–24 years	2.4	10.9	7.7
	25–44 years	24.1	35.5	31.2
	45–64 years	34.9	27.5	30.3
	65+ years	38.6	26.1	30.8

† (Age group x Sex) P<0.05; χ^2 test
‡ (Sex x Returned) interaction not significant
* (Age group x Returned) P<0.01; χ^2 test

Table 4.29 presents the number of years the general baseline sample was followed broken down by those who returned for subsequent treatment and those who did not return. There was no significant difference in the average follow-up times for those that returned and those who did not (3.03 years cf. 2.98 years).

Table 4.29: Follow-up period in years by those who returned

Returned post-baseline	*n*	Min	Max	Mean	SD
No	210	2.34	3.53	2.983	0.351
Yes	221	2.34	3.52	3.032	0.355

Table 4.30 presents the proportion of general patients by the time taken for them to return after their general course of care at baseline. Some 40.3% of the sample that returned for dental care returned within 12 months of their baseline treatment, with just over 20% returning within 6 months and a further 20% between 7 and 12 months. For 26.7% of the sample that returned after baseline, a period of over 2 years had elapsed before subsequent treatment was sought.

Table 4.30: Proportion of general baseline patients who returned for care post-baseline by the time taken to return for the first post-baseline CoC

Time taken to first return	*n*	Percent	Cumulative percent
<1 month	6	2.7	2.7
1–<3 months	20	9.0	11.8
3–<6 months	19	8.6	20.4
7–<12 months	44	19.9	**40.3**
12–<18 months	40	18.1	58.4
18–<24 months	33	14.9	73.3
24+ months	59	26.7	100.0
Total	221	100.0	

Table 4.31 shows the distribution of persons in the general sample by the nature of the first CoC received post-baseline. Patients' clinical attendance records were examined to determine the nature of the course of care they received after their baseline care. This information was pre-coded in the EXACT MIS, whereby each course of care appearing in the patient's record was given a particular description code. Based on this code, CoC type was categorised as either an Emergency or General CoC. In the patient records among the general sample, a CoC description code of 'TAFE' also appeared quite frequently and so this particular CoC type was given its own category for the time being. It is believed that 'TAFE' represents care provided by a hygienist or a student. Services provided under this CoC type will be examined shortly. Those CoC that did not obviously fall into either of these categories were initially classified as Other. Examination of the services provided under this Other CoC category later in this chapter may shed some light as to what an Other CoC may represent. In some other instances the nature of the CoC was unable to be determined and so it was classified as Unknown. Fortunately this was the case for only a

small number of patients (n=10 in this case). Of those that returned, 75% returned for another emergency course of care, whilst a further 19% received a general course of care as their first course of care post-baseline. Of those general baseline participants that returned, 73.3% first returned for an emergency course of care, whilst a further 12.2% received another general course of care as their first course of care post-baseline.

Table 4.31: Proportion of persons in the general baseline sample by the type of first post-baseline CoC

First post-baseline CoC type	*n*	Percent
Emergency	162	**73.3**
General	27	12.2
Other‡	10	4.5
TAFE‡	12	5.4
Unknown	10	4.5
Total	221	100.0

‡ Other and TAFE CoC types will be examined in terms of their service mix in later sections to determine whether they can be categorised as an emergency or general CoC.

Table 4.32 presents the proportion of patients who received emergency, general, TAFE, or other care as their first baseline CoC by the time taken for them to return for this first post-baseline CoC. Within each return interval, a greater proportion of patients were receiving emergency CoC as their first post-baseline CoC, with emergency care being received by 50%, 85%, 78.9%, 93.2%, 62.5%, 72.7%, 62.7% of those returning within the first month, in 1–<3 months, in 3–<6 months, in 7–<12 months, in 12–<18 months, in 18–<24 months and in 24+ months after baseline respectively.

Table 4.32: Proportion of general baseline patients who received emergency, general or other care as their first post-baseline CoC by the time taken to return for this first post-baseline CoC

Time taken to first return	*n*	First post-baseline CoC type (row%)				
		Emergency	General	Other	TAFE	Unknown
<1 month	6	50.0	–	–	33.3	16.7
1–<3 months	20	85.0	5.0	–	–	10.0
3–<6 months	19	78.9	–	–	–	21.1
7–<12 months	44	93.2	2.3	–	4.5	–
12–<18 months	40	62.5	22.5	2.5	7.5	5.0
18–<24 months	33	72.7	6.1	6.1	12.1	3.0
24+ months	59	62.7	23.7	11.9	1.7	–
Total	221	73.3	12.2	4.5	5.4	4.5

Table 4.33 presents the proportion of general baseline patients returning within a certain time interval for their first baseline CoC by the type of first post-baseline CoC they received. Some 46% of patients receiving an emergency CoC as their first post-baseline course of care returned within 12 months of having their baseline general CoC. Some 7.4% of patients receiving a General CoC as their first post-baseline CoC returned within 12 months, and 51.9% of the 12.2% returning for another general course of care post-baseline returned more than 2 years later (see Table 4.33).

Table 4.33: Proportion of general baseline patients returning within a certain time interval for their first post-baseline CoC by the type of first post-baseline CoC received

Time taken to first return	First post-baseline CoC type (col%) Emergency	General	Other	TAFE	Unknown	Total
	n=162	*n*=27	*n*=10	*n*=12	*n*=10	*n*=221
<1 month	1.9	–	–	16.7	10.0	2.7
1–<3 months	10.5	3.7	–	–	20.0	9.0
3–<6 months	9.3	–	–	–	40.0	8.6
7–<12 months	25.3	3.7	–	16.7	–	19.9
12–<18 months	15.4	33.3	10.0	25.0	20.0	18.1
18–<24 months	14.8	7.4	20.0	33.3	10.0	14.9
24+ months	22.8	51.9	70.0	8.3	–	26.7

Table 4.34 presents the number of courses of care general baseline patients received during the follow-up period. Some 48.7% of the general baseline sample followed did not have any courses of care after baseline, while 21.3%, 10.9%, 9.0%, 5.1%, 1.9% and 3.0% had one, two, three, four, five or six or more courses of care respectively.

Table 4.34: Distribution of the number of CoC received during the follow-up period

Number of post-baseline CoC	*n*	Percent
0 CoC	210	48.7
1 CoC	92	21.3
2 CoC	47	10.9
3 CoC	39	9.0
4 CoC	22	5.1
5 CoC	8	1.9
6+ CoC	13	3.0
Total	431	100.0

Table 4.35 presents the distribution of post-baseline CoC types for those that returned and across the total sample. The proportion of patients represented within each post-baseline CoC type group are not mutually exclusive, as patients may have returned for different types of courses of care during the follow-up period. For those that returned after

baseline, 82.8% received one or more emergency courses of care during the follow-up period, and 21.3% received another general course of care.

Table 4.35: Distribution of post-baseline CoC types for those that returned and across the total sample

Post-baseline CoC	*n*	Returned (*n*=221)	All (*n*=431)
Emergency	183	**82.8**	42.5
General	47	21.3	10.9
Other	12	5.4	2.8
TAFE	25	11.3	5.8
Unknown	11	5.0	2.6

Table 4.36 presents the average time between the general baseline CoC and the first emergency CoC and general CoC received post-baseline. On average, general baseline patients returned for an emergency CoC within 13.2 months of their baseline general CoC. For those receiving another general CoC post-baseline, the average time between the baseline general CoC and the first general CoC received post-baseline was 26.3 months.

Table 4.36: Average time in months between the general baseline CoC and the first emergency and general post-baseline CoC

Post-baseline CoC type		Average time between baseline CoC and first post-baseline CoC (months)
		(*n*=183)
Emergency	Mean	13.165
	SD	9.417
	Min	0.230
	Max	38.630
		(*n*=47)
General	Mean	26.289
	SD	10.037
	Min	2.170
	Max	40.307

Table 4.37 shows the proportion of patients broken down by both the number of courses of care they received during the follow-up and the type of post-baseline CoC they received. Almost 58% of the sample followed did not receive any emergency care after baseline, whilst 18.6%, 9.0%, 8.4%, 3.5%, 0.7% and 2.3% received one, two, three, four, five or six or more courses of emergency care respectively. Some 89.1% of the sample followed did not receive any general care after baseline, whilst 10.7% and 0.2% received one or two

courses of care respectively. Overall, 42.5% received some quantity of emergency care and 10.9% of persons followed received some general care after baseline.

Table 4.37: Distribution of the number of CoC received during the follow-up period by the post-baseline CoC type

Post-baseline CoC type	0 CoC	1 CoC	2 CoC	3 CoC	4 CoC	5 CoC	6+ CoC	
	Number of post-baseline CoC (total *n*=431)							
	n=248	*n*=80	*n*=39	*n*=36	*n*=15	*n*=3	*n*=10	
Emergency	57.5	18.6	9.0	8.4	3.5	0.7	2.3	=42.5%
	n=384	*n*=46	*n*=1	*n*=0	*n*=0	*n*=0	*n*=0	
General	89.1	10.7	0.2	–	–	–	–	=10.9%
	n=419	*n*=11	*n*=0	*n*=1	*n*=0	*n*=0	*n*=0	
Other	97.2	2.6	–	0.2	–	–	–	=2.8%
	n=406	*n*=14	*n*=8	*n*=2	*n*=1	*n*=0	*n*=0	
TAFE	94.2	3.2	1.9	0.5	0.2	–	–	=5.8%
	n=420	*n*=7	*n*=1	*n*=2	*n*=1	*n*=0	*n*=1	
Unknown	97.4	1.6	0.2	0.5	0.2	–	0.2	=2.6%
	n=210	*n*=92	*n*=47	*n*=39	*n*=22	*n*=8	*n*=13	
All CoC types	48.7	21.3	10.9	9.0	5.1	1.9	3.0	=51.3%

Table 4.38 shows the average time (in months) between all post-baseline courses of care for those returning after baseline irrespective of the type of care sought. Those having one course of care post-baseline returned for care on average 16.8 months later. For those having 2 post-baseline courses of care, the average time between courses of care was 12.7 months. Logically, the average time between courses of care decreased as the number of courses of care received increased. Across the sample of those who returned, the average time between courses of care was 12.4 months.

Table 4.38: Average time in months between the numbers of courses of care received post-baseline across all post-baseline CoC types

All post-baseline CoC types		1 CoC[a] (*n*=92)	2 CoC[b] (*n*=47)	3 CoC (*n*=39)	4 CoC (*n*=22)	5 CoC (*n*=8)	6+ CoC (*n*=13)	Total (*n*=221)
		Average time between CoC (months)						
		Number of post-baseline CoC						
Total[†*]	Mean	16.839	12.700	8.716	6.986	6.101	3.377	12.364
	SD	11.719	4.877	3.284	2.160	1.040	0.898	9.166
	Min	0.460	1.118	0.986	1.611	4.807	1.918	0.460
	Max	39.123	20.285	13.468	10.003	7.483	4.730	39.123

† for all CoC types
* (P<0.0001); ANOVA
a time between baseline CoC & first post-baseline CoC
b time between baseline CoC & first post-baseline CoC and first & second post-baseline CoC. The same logic applies for those who had 3 CoC, 4 CoC 5 CoC and 6+ CoC

Table 4.39 shows the average time (in months) between courses of care broken down by the actual number of post-baseline courses of care received and the post-baseline CoC type. For those who had only one emergency CoC post-baseline, they returned, on average, 16.3 months after their general baseline care. For those who had only one general CoC post-baseline, the average time taken for them to return for another general CoC post-baseline was 26.5 months. Overall, there was an average time period of 7.7 months between multiple emergency CoC and 26.1 months between general CoC post-baseline.

Table 4.39: Average time interval in months between the numbers of CoC received post-baseline by the nature of the post-baseline course of care

Post-baseline CoC type		Average time between CoC (months) Number of post-baseline CoC 1 CoC[a]	2 CoC[b]	3 CoC	4 CoC	5 CoC	6+ CoC	Total
		(*n*=80)	(*n*=39)	(*n*=36)	(*n*=15)	(*n*=3)	(*n*=10)	(*n*=183)
Emergency*	Mean	16.342‡	9.405	8.097	5.870	4.559	3.154	7.685†
	SD	10.714	7.758	4.601	2.951	2.853	0.873	5.923
	Min	0.230	0.395	0.460	1.271	1.266	2.130	0.395
	Max	38.630	26.466	16.340	11.945	6.288	4.734	26.466
		(*n*=46)	(*n*=1)	(*n*=0)	(*n*=0)	(*n*=0)	(*n*=0)	(*n*=47)
General	Mean	26.486	9.304	–	–	–	–	26.120
	SD	10.056	.	–	–	–	–	10.257
	Min	2.170	9.304	–	–	–	–	2.170
	Max	40.307	9.304	–	–	–	–	40.307

* (P<0.0001); ANOVA

a time between baseline emergency CoC & post-baseline CoC for those who returned for only 1 CoC during the follow-up period

b time between baseline CoC & first post-baseline CoC and first & second post-baseline CoC for those who returned for 2 CoC during the follow-up period. The same logic applies for those who had 3 CoC, 4 CoC 5 CoC and 6+ CoC

‡ this mean represents the average time interval (in months) between the general baseline CoC and the first post-baseline emergency CoC for those who only had 1 emergency CoC post-baseline

† this average time interval represents the average time between emergency CoC only and so excludes the average time interval between the general baseline CoC and the first post-baseline emergency CoC

Table 4.40 presents the mean number of visits and CoC per follow-up year within each post-baseline CoC type. Visits per follow-up year and CoC per follow-up year were calculated by dividing the total number of visits made by the patient and the total number of post-baseline CoC received by the patient respectively by the number of years followed.

Across all post-baseline CoC types for those that returned, baseline participants were making, on average, 1.25 visits per follow-up year to the dentist. Those receiving emergency CoC post-baseline were making 0.85 visits per follow-up year for emergency care and those receiving general CoC post-baseline were visiting the dentist, on average, 1.02 times per follow-up year.

The average number of courses of care per follow-up year for those that returned was 0.81. Those receiving emergency CoC post-baseline were having an average of 0.76 emergency courses of care per follow-up year, whilst those returning for general CoC were having an average of 0.33 general courses of care per follow-up year.

Table 4.40: Mean number of visits and CoC per follow-up year by post-baseline CoC type

		Post-baseline CoC type					Totals	
		Emergency (*n*=183)	General (*n*=47)	Other (*n*=12)	TAFE (*n*=25)	Unknown (*n*=11)	Returned (*n*=221)	All (*n*=431)
Visits per follow-up years	Mean	0.846	1.024	0.360	2.455	0.748	1.252	0.642
	SD	0.739	0.857	0.162	1.709	0.467	1.350	1.151
	Min	0.28	0.29	0.29	0.30	0.31	0.28	0.00
	Max	6.47	4.65	0.87	5.47	1.79	6.97	6.97
CoC per follow-up years	Mean	0.760	0.327	0.360	0.566	0.585	0.812	0.416
	SD	0.846	0.051	0.162	0.278	0.460	0.649	0.617
	Min	0.28	0.29	0.29	0.30	0.29	0.28	0.00
	Max	4.75	0.59	0.87	1.26	1.79	4.75	4.75

4.4.2.4 Service provision

The following section examines the proportion of persons in the general baseline sample receiving particular types of services during the follow-up period. In addition, the mean number of services received per follow-up year was also examined since the follow-up period varied for patients within the sample. This was calculated by dividing the total number of services received by the number of years followed. Following the ADA Schedule of Dental Services (1992), services received during the follow-up period were collapsed into the ten main areas of service.

Distribution of services

Table 4.41 shows the percentage of patients who had at least one service from the main service areas for those that returned. There was a large difference in the percentage of patients receiving preventive services, depending on course of care type. Significantly fewer persons received preventive services if they attended for emergency dental care compared to those who attended for general dental care. Significantly more people returning for emergency care received oral surgery services compared to those who had general care. In addition, a significantly greater proportion of persons who attended for emergency care received less prosthodontic services than general attenders and emergency attenders received more general/miscellaneous services compared to those who attended for general dental care.

Table 4.41: Distribution of services by post-baseline CoC type

Main service area	Post-baseline CoC type: Emergency (*n*=183)	General (*n*=47)	Other (*n*=12)	Tafe (*n*=25)	Unknown (*n*=11)	Totals: Returned (*n*=221)	All (*n*=431)
Diagnostic services	94.0	91.5	100.0	76.0	45.5	91.4	46.9
Preventive services†***	**25.7** ↓	**55.3**	–	76.0	63.6	40.7	20.9
Periodontic services	4.4	–	–	68.0	–	10.9	5.6
Oral surgery services†**	**26.2** ↑	**4.3**	–	–	–	22.2	11.4
Endodontic services	13.7	8.5	–	–	9.1	12.2	6.3
Restorative services†*	69.4	53.2	–	4.0	27.3	64.7	33.2
Crown and bridge services	2.2	–	–	–	–	1.8	0.9
Prosthodontic services†*	**6.0** ↓	**17.0**	–	–	9.1	8.1	4.2
Orthodontic services	–	–	–	–	–	–	–
General/misc. services†*	**24.6** ↑	**10.6**	–	68.0	–	28.5	14.6

† Significant difference between Emergency and General post-baseline CoC types in terms of the proportion receiving particular service types: *** (P<0.001), ** (P<0.01), * (P<0.05); χ^2 test

Table 4.42 shows the mean number of services per follow-up year by the main area of service for various post-baseline CoC types. Mean service rates showed that, for general baseline participants returning for emergency CoC, diagnostic, preventive, oral surgery and restorative services dominated the distribution of services, while periodontic and prosthodontic services were provided at low rates for those receiving emergency dental care. For those receiving a general CoC post-baseline, diagnostic, preventive, restorative and prosthodontic services were provided at higher rates.

Table 4.42: Mean number of services per follow-up year by main area of service and post-baseline CoC type

Main service area		Post-baseline CoC type: Emergency (*n*=183)	General (*n*=47)	Other (*n*=12)	Tafe (*n*=25)	Unknown (*n*=11)	Totals: Returned (*n*=221)	All (*n*=431)
Diagnostic	Mean	0.950	0.568	0.360	1.221	0.253	1.078	0.553
	SD	0.801	0.330	0.162	1.695	0.333	1.023	0.909
	Min	0.000	0.000	0.290	0.000	0.000	0.000	0.000
	Max	6.040	1.452	0.866	5.834	0.950	6.563	6.563
Preventive	Mean	0.140	0.239	0.000	3.268	0.678	0.570	0.292
	SD	0.309	0.284	0.000	3.121	1.212	1.496	1.107
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	2.157	1.452	0.000	12.019	4.104	12.335	12.335
Periodontic	Mean	0.016	0.000	0.000	0.543	0.000	0.074	0.038
	SD	0.075	0.000	0.000	0.517	0.000	0.260	0.190
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	0.431	0.000	0.000	1.823	0.000	1.967	1.967
Oral surgery	Mean	0.120	0.021	0.000	0.000	0.000	0.104	0.053
	SD	0.258	0.105	0.000	0.000	0.000	0.245	0.183
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	2.120	0.607	0.000	0.000	0.000	2.120	2.120
Endodontic	Mean	0.070	0.086	0.000	0.000	0.186	0.085	0.044
	SD	0.221	0.296	0.000	0.000	0.616	0.318	0.231
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	1.864	1.452	0.000	0.000	2.044	2.796	2.796
Restorative	Mean	0.575	0.486	0.000	0.013	0.190	0.590	0.303
	SD	0.636	0.716	0.000	0.064	0.357	0.706	0.585
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	3.147	2.948	0.000	0.320	0.896	3.147	3.147
Crown/bridge	Mean	0.009	0.000	0.000	0.000	0.000	0.007	0.004
	SD	0.063	0.000	0.000	0.000	0.000	0.058	0.041
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	0.633	0.000	0.000	0.000	0.000	0.633	0.633
Prosthodontic	Mean	0.045	0.283	0.000	0.000	0.057	0.100	0.051
	SD	0.226	0.692	0.000	0.000	0.189	0.405	0.294
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	1.905	2.373	0.000	0.000	0.628	2.496	2.496
Orthodontic	Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	SD	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	0.000	0.000	0.000	0.000	0.000	0.000	0.000
General/misc.	Mean	0.109	0.039	0.000	0.857	0.000	0.195	0.100
	SD	0.282	0.114	0.000	0.947	0.000	0.484	0.360
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Max	3.020	0.435	0.000	3.282	0.000	3.282	3.282
Total	Mean	2.033	1.721	0.360	5.901	1.364	2.805	1.438
	SD	1.822	1.249	0.162	5.109	1.324	3.163	2.662
	Min	0.296	0.290	0.290	0.302	0.311	0.296	0.000
	Max	13.806	6.679	0.866	18.596	4.104	19.326	19.326

Table 4.43 shows the distribution of services in the main service areas by the number of courses of care received during the follow-up period for those attending for emergency dental care. A significant increase in the mean service rate across increasing numbers of emergency courses of care was observed across all main areas of service (with the exception of orthodontic services, whereby no-one received any of these services). The greatest increase in mean service rates across increasing numbers of emergency CoC received was observed for periodontic services, endodontic services and prosthodontic services. Overall, the mean number of services received increased almost eight-fold as the number of emergency courses of care received increased.

Table 4.43: Those attending for emergency CoC post-baseline: mean number of services per follow-up year for those that returned for emergency care and across the total sample and also by the number of emergency CoC received post-baseline

Main service area		Post-baseline All (*n*=431)	Post-baseline Returned (*n*=183)	Number of post-baseline Emergency CoC: 1 CoC (*n*=80)	2 CoC (*n*=39)	3 CoC (*n*=36)	4 CoC (*n*=15)	5 CoC (*n*=3)	6+ CoC (*n*=10)	
Diagnostic	Mean	0.403	0.950	0.431	0.995	1.145	1.696	1.973	2.795	*
	SD	0.702	0.801	0.225	0.381	0.524	0.562	0.578	1.633	
	Min	0.000	0.000	0.000	0.296	0.000	0.661	1.564	0.876	
	Max	6.040	6.040	0.878	1.800	2.126	2.436	2.634	6.040	
Preventive	Mean	0.059	0.140	0.058	0.161	0.129	0.264	0.125	0.563	*
	SD	0.213	0.309	0.153	0.304	0.220	0.472	0.217	0.710	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Max	2.157	2.157	0.862	1.155	0.756	1.524	0.376	2.157	
Periodontic	Mean	0.007	0.016	0.005	0.000	0.000	0.070	0.096	0.113	*
	SD	0.049	0.075	0.046	0.000	0.000	0.147	0.166	0.184	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Max	0.431	0.431	0.408	0.000	0.000	0.404	0.287	0.431	
Oral surgery	Mean	0.051	0.120	0.056	0.117	0.144	0.156	0.096	0.500	*
	SD	0.178	0.258	0.130	0.241	0.228	0.212	0.166	0.687	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Max	2.120	2.120	0.404	1.087	0.808	0.631	0.287	2.120	
Endodontic	Mean	0.030	0.070	0.004	0.066	0.063	0.195	0.230	0.401	*
	SD	0.148	0.221	0.038	0.177	0.182	0.322	0.201	0.591	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Max	1.864	1.864	0.339	0.892	0.911	1.186	0.376	1.864	
Restorative	Mean	0.244	0.575	0.216	0.512	0.821	1.176	1.797	1.541	*
	SD	0.502	0.636	0.266	0.476	0.499	0.806	0.261	1.031	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	1.505	0.000	
	Max	3.147	3.147	1.304	2.137	2.021	2.826	2.009	3.147	
Crown/bridge	Mean	0.004	0.009	0.008	0.000	0.000	0.000	0.000	0.103	*
	SD	0.041	0.063	0.048	0.000	0.000	0.000	0.000	0.224	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Max	0.633	0.633	0.320	0.000	0.000	0.000	0.000	0.633	
Prosthodontic	Mean	0.019	0.045	0.004	0.009	0.026	0.269	0.000	0.265	*
	SD	0.149	0.226	0.033	0.058	0.087	0.549	0.000	0.591	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Max	1.905	1.905	0.296	0.363	0.322	1.905	0.000	1.738	
Orthodontic	Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	SD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Max	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
General/misc.	Mean	0.046	0.109	0.046	0.113	0.113	0.091	0.287	0.563	*
	SD	0.191	0.282	0.116	0.177	0.185	0.157	0.497	0.924	
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Max	3.020	3.020	0.402	0.584	0.624	0.395	0.861	3.020	
Total	Mean	0.863	2.033	0.828	1.973	2.441	3.917	4.603	6.843	*
	SD	1.555	1.822	0.339	0.681	0.790	1.254	0.749	3.423	
	Min	0.000	0.296	0.296	0.889	0.866	2.423	3.753	2.920	
	Max	13.806	13.806	1.903	4.701	4.350	6.460	5.165	13.806	

* (P<0.0001); ANOVA

Table 4.44 shows the distribution of services in the main service areas by the number of courses of care received during the follow-up period for those attending for general dental care. Mean services rates varied across the number of general courses of care received, with significant differences observed for the receipt of restorative services over multiple general CoC. As the number of general courses of care received increased, restorative services increased almost seven-fold. Overall, the mean number of services received increased almost two-and-a-half-fold as the number of general courses of care received increased.

Table 4.44: Those attending for general CoC post-baseline: mean number of services per follow-up year for those that returned for general care and across the total sample and also by the number of general CoC received post-baseline

Main service area		Post-baseline All (*n*=431)	Post-baseline Returned (*n*=47)	Number of post-baseline General CoC 1 CoC (*n*=46)	Number of post-baseline General CoC 2 CoC (*n*=1)	
Diagnostic	Mean	0.062	0.568	0.567	0.590	
	SD	0.207	0.330	0.333	.	
	Min	0.000	0.000	0.000	0.590	
	Max	1.452	1.452	1.452	0.590	
Preventive	Mean	0.026	0.239	0.231	0.590	
	SD	0.119	0.284	0.282	.	
	Min	0.000	0.000	0.000	0.590	
	Max	1.452	1.452	1.452	0.590	
Periodontic	Mean	0.000	0.000	0.000	0.000	
	SD	0.000	0.000	0.000	.	
	Min	0.000	0.000	0.000	0.000	
	Max	0.000	0.000	0.000	0.000	
Oral surgery	Mean	0.002	0.021	0.022	0.000	
	SD	0.035	0.105	0.106	.	
	Min	0.000	0.000	0.000	0.000	
	Max	0.607	0.607	0.607	0.000	
Endodontic	Mean	0.009	0.086	0.088	0.000	
	SD	0.101	0.296	0.299	.	
	Min	0.000	0.000	0.000	0.000	
	Max	1.452	1.452	1.452	0.000	
Restorative	Mean	0.053	0.486	0.432	2.948	***
	SD	0.279	0.716	0.622	.	
	Min	0.000	0.000	0.000	2.948	
	Max	2.948	2.948	2.575	2.948	
Crown/bridge	Mean	0.000	0.000	0.000	0.000	
	SD	0.000	0.000	.	.	
	Min	0.000	0.000	0.000	0.000	
	Max	0.000	0.000	0.000	0.000	
Prosthodontic	Mean	0.031	0.283	0.289	0.000	
	SD	0.243	0.692	0.698	.	
	Min	0.000	0.000	0.000	0.000	
	Max	2.373	2.373	2.373	0.000	
Orthodontic	Mean	0.000	0.000	0.000	0.000	
	SD	0.000	0.000	.	.	
	Min	0.000	0.000	0.000	0.000	
	Max	0.000	0.000	0.000	0.000	
General/misc.	Mean	0.004	0.039	0.039	0.000	
	SD	0.039	0.114	0.115	.	
	Min	0.000	0.000	0.000	0.000	
	Max	0.435	0.435	0.435	0.000	
Total	Mean	0.188	1.721	1.669	4.128	*
	SD	0.675	1.249	1.210	.	
	Min	0.000	0.290	0.290	4.128	
	Max	6.679	6.679	6.679	4.128	

*** (P<0.0001), * (P<0.05); ANOVA

4.4.2.5 Attendance behaviour patterns

Table 4.45 shows the percentage of people in the general baseline sample receiving various combinations of course of care types post-baseline. Patients' dental attendance during the follow-up period was defined based on the types of CoC they received post-baseline. Some 63.8% of persons that returned for care post-baseline received emergency care only, while 6.8% received only general care after baseline. Some 8.6% of patients returning for care after their baseline care received a combination of emergency and general care during the follow-up period. For those who did not return, it was not possible to determine what kind of dental attender the person was and so they remained unclassified.

Table 4.45: Distribution of general baseline patients according to their dental attendance behaviour during the follow-up period (based on the types of post-baseline CoC received)

Dental attendance during follow-up (based on CoC type)	*n*	Percent	Cumulative percent
Emergency	141	63.8	63.8
General	15	6.8	70.6
Other	1	.5	71.0
TAFE	7	3.2	74.2
Unknown	5	2.3	76.5
Emergency and General	19	8.6	85.1
Emergency, General and Other	2	.9	86.0
Emergency and Other	3	1.4	87.3
Emergency and Unknown	4	1.8	89.1
Emergency and TAFE	12	5.4	94.6
General and Other	4	1.8	96.4
General and Unknown	1	.5	96.8
General and TAFE	3	1.4	98.2
Other and TAFE	1	.5	98.6
Emergency, General and Unknown	1	.5	99.1
Emergency, General and TAFE	1	.5	99.5
General, Other and TAFE	1	.5	100.0
Total	221	100.0	

Once again, as done for the Emergency baseline sample, if one considered the nature of the baseline CoC when classifying a patient as an emergency attender, general attender or some combination of the two, 15 persons ended up being classified as a general attender and 160 were classified as an Emergency and a General attender (i.e., subjects initially received a general CoC at baseline and then returned for emergency care or returned for both emergency and general dental care post-baseline: 160 represents the sum of 141

Emergency attenders and 19 Emergency and General attenders (as given in Table 4.45)). Note that since these patients initially received a general CoC at baseline, and the nature of this baseline CoC is also used to classify the patient's pattern of dental care attendance, their pattern of dental care will always include a general CoC and, therefore, they cannot be classified as only having an emergency dental care pattern of attendance. These classification groups are presented in Table 4.46.

Table 4.46: Behaviour attendance pattern based on baseline CoC and CoC types received post-baseline

Behaviour attendance pattern	*n*	% of total sample (*n*=431)
Emergency	NA‡	NA‡
General	15	3.5
Emergency and General†	160	37.1

† includes those returning for general CoC only and those returning for both

‡ not applicable as these patient's pattern of dental care includes their baseline general CoC so they cannot be classified as only having an emergencydental care pattern of attendance

Table 4.47 presents the proportion of people in the general baseline sample receiving various combinations of course of care types post-baseline by the number of CoC they received. Of those receiving emergency care only post-baseline, 48.9% had just the one emergency CoC during the follow-up period, while 20.6% had two emergency CoC, 18.4% had three emergency CoC and the remaining 12% had four or more courses of emergency care. The majority of persons who only had general dental care post-baseline only had the one course of general care (93.3%), and a small proportion (6.7%) had two courses of general care. For those who were classified as an emergency and general attender, 21.1% had two courses of care (i.e., one emergency and one general CoC), 31.6% had three courses of care and the remaining 47.3% had four or more courses of care.

Table 4.47: Distribution of general baseline patients according to their dental attendance behaviour during the follow-up period by the number of post-baseline CoC

Dental attendance during follow-up (based on CoC type)		Number of post-baseline CoC (row %)					
	n	1 CoC	2 CoC	3 CoC	4 CoC	5 CoC	6+ CoC
Emergency	141	48.9	20.6	18.4	7.1	2.1	2.8
General	15	93.3	6.7	–	–	–	–
Other	1	100.0	–	–	–	–	–
Tafe	7	57.1	28.6	14.3	–	–	–
Unknown	5	80.0	–	20.0	–	–	–
Emergency and General	19	–	21.1	31.6	26.3	15.8	5.3
Emergency, General and Other	2	–	–	–	–	50.0	50.0
Emergency and Other	3	–	33.3	33.3	–	–	33.3
Emergency and Unknown	4	–		25.0	25.0	–	50.0
Emergency and TAFE	12	–	33.3	8.3	25.0	8.3	25.0
General and Other	4	–	75.0	–	25.0	–	–
General and Unknown	1	–	100.0	–	–	–	–
General and TAFE	3	–	33.3	33.3	33.3	–	–
Other and TAFE	1	–	100.0				
Emergency, General and Unknown	1	–					100.0
Emergency, General and TAFE	1	–			100.0		
General, Other and TAFE	1	–		100.0			
Total	221	41.6	21.3	17.6	10.0	3.6	5.9

4.4.3 Comparing baseline samples

Having followed both samples over time and examined each independently of the other, it now seems appropriate to compare the outcomes between the two groups and test for significant differences.

Note that dental attendance patterns for the baseline sample were determined by examining the nature of each of the courses of care received during the follow-up period. Courses of care were classified as either emergency or general. For some cases, the nature of the course of care was unable to be ascertained and it was coded as 'unknown'. Upon examination, however (see Sections 4.4.1 and 4.4.2), those coded as 'other' represented people who received diagnostic services (e.g., general examination (011)), preventive services, endodontic services and/or restorative services in their course(s) of care. This service mix was very similar to a general course of care, so these courses of care were recoded as a general course of care. Similarly those courses of care coded as TAFE were also recoded as a general course of care, as services received during a TAFE course were diagnostic, preventive, periodontic and/or restorative services.

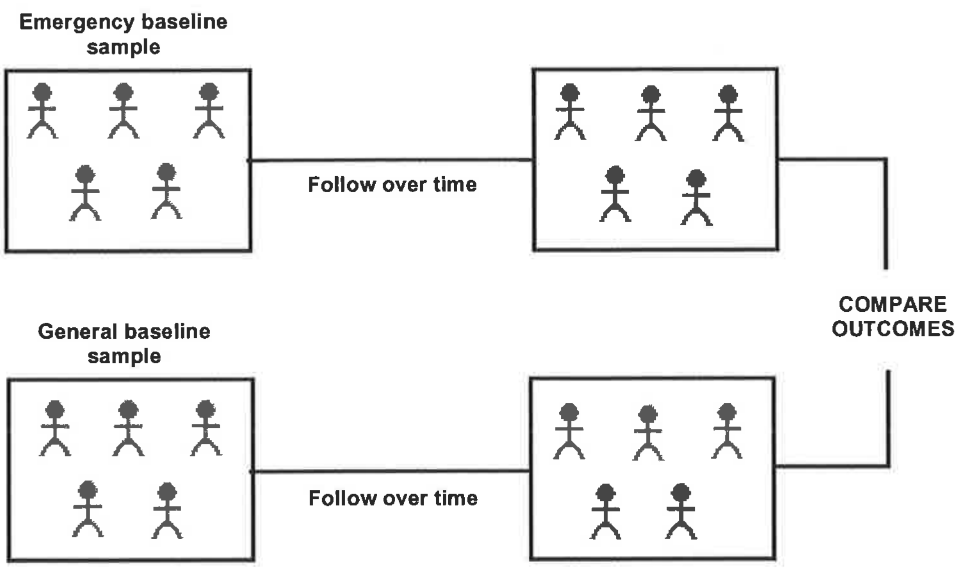


Figure 4.2: Comparing baseline samples

4.4.3.1 Disease experience among the follow-up sample

Table 4.48 presents the mean number of decayed, missing and filled teeth as at the beginning of the follow-up period for those that did and did not return during the follow-up. Patients who revisited the public dental service during the follow-up period had slightly higher caries experience (i.e., a higher level of unmet dental need) than those who did not (1.04 D_3 teeth cf. 0.92 D_3 teeth). This difference, however, was not statistically significant. Both the number of filled and missing teeth was significantly higher among those who returned during the follow-up period compared to those who did not return. Those who returned had, on average, 10.01 filled teeth and 8.47 missing teeth compared with 7.57 filled teeth and 6.94 missing teeth respectively among those who did not return.

Table 4.48: Disease experience at the beginning of the follow-up period by dental attendance post-baseline across the total sample

	RETURNED POST-BASELINE					
	Yes (*n*=473)		No (*n*=308)		Total (*n*=781)	
Variables‡	Mean†	SD	Mean†	SD	Mean†	SD
D_3 crowns (D+R)**	1.036	2.140	0.919	1.876	0.990	2.040
M crowns (E+M)**	8.469	5.942	6.935	6.059	7.864	6.031
F crowns (F+Fu)	10.008	5.591	7.571	5.451	9.047	5.659
D_1 and D_3 crowns (D_1+D+R)**	1.112	2.284	1.029	2.058	1.079	2.197
D_1 crowns	0.076	0.646	0.110	0.560	0.090	0.614
D_3MFT (D_3+M+F)***	19.514	6.834	15.425	7.978	17.901	7.570
D_1D_3MFT (D_1+D_3+M+F)***	19.590	6.811	15.536	7.901	17.991	7.521

‡ D, M, F teeth after the receipt of baseline treatment

† The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).

***(P<0.001), **(P<0.01), *(P<0.05); ANOVA

Disease experience at the beginning of the follow-up period by dental attendance post-baseline and baseline sample status is presented in Table 4.49. Looking at disease experience between baseline samples for those that returned, patients in the emergency sample had significantly more decayed teeth (1.35 D_3 teeth cf. 0.59 D_3 teeth) and missing teeth (9.04 M teeth cf. 7.65 M teeth) than those in the general sample. The average number of filled teeth was not significantly lower among patients in the emergency sample compared to the general baseline sample (9.67 F teeth cf. 10.49 F teeth).

Among those who did not return, significant differences were found in the average number of decayed and filled teeth between the baseline samples, with patients in the emergency sample having more decayed teeth (1.57 D_3 teeth cf. 0.53 D_3 teeth) and less filled teeth (6.26 F teeth cf. 8.36 F teeth) than patients in the general sample. The number of missing teeth, although not significantly different between the samples, was higher in the emergency sample compared to the general sample (7.25 M teeth cf. 6.74 M teeth).

Table 4.49: Disease experience at the beginning of the follow-up period by dental attendance post-baseline and baseline sample status

	RETURNED POST-BASELINE											
	Yes				No				Total			
	Emergency sample (*n*=278)		General sample (*n*=195)		Emergency sample (*n*=116)		General sample (*n*=192)		Emergency sample (*n*=394)		General sample (*n*=387)	
Variables‡	**Mean†**	**SD**	**Mean†**	**SD**	**Mean†**	**SD**	**Mean†**	**SD**	**Mean†**	**SD**	**Mean†**	**SD**
D_3 crowns	1.345	2.530	0.595	1.294	1.569	2.534	0.526	1.175	1.411	2.530	0.561	1.236
M crowns	9.043	6.091	7.651	5.638	7.250	6.785	6.745	5.585	8.515	6.348	7.202	5.623
F crowns	9.669	5.503	10.492	5.693	6.259	4.985	8.365	5.579	8.665	5.571	9.437	5.729
D_1 & D_3 crowns	1.378	2.543	0.733	1.794	1.819	2.812	0.552	1.201	1.508	2.629	0.643	1.529
D_1 crowns	0.032	0.197	0.138	0.977	0.250	0.843	0.026	0.239	0.096	0.495	0.083	0.715
D_3MFT	20.058	6.713	18.738	6.947	15.078	8.251	15.635	7.823	18.591	7.540	17.199	7.547
D_1D_3MFT	20.090	6.716	18.877	6.898	15.328	8.078	15.661	7.811	18.688	7.457	17.282	7.530

‡ D, M, F teeth after the receipt of baseline treatment

† The following calculations were performed for those cases with no more than 1 missing value in the upper arch (i.e., no more than one missing crown status recordings among c18, c17, c16, c15, c14, c13, c12, c11, c21, c22, c23, c24, c25, c26 c27, c28) and no more than one missing value in the lower arch (i.e., no more than one missing crown status recordings among c38, c37, c36, c35, c34, c33, c32, c31, c41, c42, c43, c44, c45, c46, c47, c48).

SIGNIFICANCE TESTING:

Between samples:

Returned='Yes': D_3xReturned $P<0.0001$; MxReturned $P=0.012$; D_1D_3xReturned $P=0.002$; D_3MFTxReturned $P=0.039$; D_1D_3MFTxReturned $P=0.056$

Returned='No': D_3xReturned $P<0.0001$; FxReturned $P=0.001$; D_1D_3xReturned $P<0.0001$; D_1xReturned $P=0.001$

4.4.3.2 Follow-up period

Table 4.50 presents the number of years the emergency and general baseline samples were followed. The follow-up period varied significantly between the samples, with the emergency baseline sample followed for an average of 2.9 years and the general baseline sample followed for a slightly longer period of 3.0 years. Across the total sample, the follow-up period averaged 2.9 years.

Table 4.50: Follow-up period in years from baseline date† to 31 December 2002 by baseline sample status

		Follow-up period (years)			
Baseline sample*	*n*	Min	Max	Mean	SD
Emergency	413	2.24	3.51	2.85	0.46
General	431	2.24	3.53	3.01	0.35
Total	844	2.24	3.53	2.93	0.42

† Recruitment of baseline participants commenced from June 1999
* (P<0.0001); ANOVA

4.4.3.3 Dental visiting (post-baseline study)

There were significant differences between samples in terms of the proportion of patients returning for treatment after baseline (see Table 4.51). A considerably larger proportion of patients who received an emergency CoC at baseline returned for subsequent treatment compared to those who received a general CoC at baseline. Approximately 71% of the emergency baseline sample returned for subsequent treatment, compared to 51% of the general baseline sample.

A number of reasons may exist for those who did not return for treatment, such as they may not have needed dental care, they may have moved/relocated interstate, they may no longer be eligible for public dental care or they may have died. However, unless SADS is notified of one's current situation, their details are not updated on the database.

Table 4.51: Proportion of baseline sample returning for treatment post-baseline

	Baseline sample		
Returned post-baseline*	Emergency (*n*=413)	General (*n*=431)	Total (*n*=844)
No	29.3	48.7	39.2
Yes	70.7	51.3	60.8

* (P<0.0001); χ^2 test

The age by sex distribution did not differ significantly between baseline samples. The average age of those in the emergency baseline sample was approximately 52 years, compared to just over 49 years for those in the general baseline sample. On average, males within the sample were slightly older. The average age of males across samples was approximately 53 years, compared to 49 years for females (see Table 4.52).

Table 4.52: Age by sex distribution of the baseline sample

Baseline sample	Sex	N	Mean age	SD
Emergency	Male	173	54.58	17.55
	Female	240	49.47	17.20
	Total	413	51.61	17.51
General	Male	176	50.93	17.81
	Female	255	47.91	17.09
	Total	431	49.14	17.43
Total	Male	349	52.74	17.75
	Female	495	48.66	17.14
	Total	844	50.35	17.50

Table 4.53 presents the mean number of years the baseline sample was followed, broken down by baseline sample status and by those who did and did not return for dental care post-baseline. For those who did not return, the average number of years the emergency baseline sample was followed did not differ significantly from the average number of years the general sample was followed (2.8 years cf. 3.0 years). Those in each baseline sample who returned for care post-baseline were also followed for a similar period on average (i.e., 2.9 years for emergency baseline patients and 3.0 years for general baseline patients).

Table 4.53: Mean follow-up period in years by baseline sample status and dental attendance post-baseline

Baseline sample*	Returned post-baseline‡	N	Mean follow-up†	SD
Emergency	No	121	2.76	0.46
	Yes	292	2.88	0.46
	Total	413	2.85	0.46
General	No	210	2.98	0.35
	Yes	221	3.03	0.35
	Total	431	3.01	0.35
Total	No	331	2.90	0.41
	Yes	513	2.95	0.42
	Total	844	2.93	0.42

† (Years followed x baseline sample x returned post-baseline) interaction not significant
‡ (Years followed x returned post-baseline) P<0.01; ANOVA
* (Years followed x baseline sample) P<0.001; ANOVA

Table 4.54 presents the proportion of emergency and general baseline patients by the time interval taken to return (in months) for their first post-baseline CoC. As shown in Table 4.54, there were significant differences between baseline samples in relation to the time taken to return after baseline treatment. Of those that returned, almost a quarter of the emergency baseline sample returned within a month of their baseline care compared to fewer than 3% of the general baseline sample. Some 72.6% of the emergency baseline sample that returned for subsequent dental care returned within 12 months of their baseline CoC, compared to 40.3% of the general baseline sample.

Table 4.54: Proportion of emergency and general baseline patients by time taken to return for first post-baseline CoC

Time interval taken to return for first post-baseline CoC*	Baseline sample		
	Emergency (*n*=292)	General (*n*=221)	Total (*n*=513)
<1 month	23.3	2.7	14.4
1–<3 months	13.4	9.0	11.5
3–<6 months	15.8	8.6	12.7
7–<12 months	20.2	19.9	20.1
12–<18 months	12.0	18.1	14.6
18–<24 months	7.2	14.9	10.5
24+ months	8.2	26.7	16.2

* (P<0.0001); χ^2 test

Table 4.55 presents the average time taken to return (in months) for the first post-baseline CoC by baseline sample. On average, the emergency baseline sample returned for subsequent treatment within 8.5 months of their baseline treatment, whereas patients in the general baseline sample returned 16.7 months later. Across the sample, the average time taken to return was 12.0 months.

Table 4.55: Average time taken to return in months for first post-baseline CoC by baseline sample status

Baseline sample*	$n^{\dagger}$	Time taken to return‡ (months)			
		Min	Max	Mean	SD
Emergency	292	0.03	39.19	8.51	8.99
General	221	0.46	40.57	16.70	11.25
Total	513	0.03	40.57	12.04	10.81

* (P<0.0001); ANOVA
‡ from baseline date to first post-baseline CoC
† those that returned

Presented in Table 4.56 is the distribution of the first post-baseline CoC type by baseline sample status. The proportion of patients in each sample first returning for a particular CoC type varied significantly, with 53% of the emergency baseline sample first returning for another emergency CoC, compared to 37.6% of the general baseline sample returning for emergency care.

Table 4.56: Distribution of first post-baseline CoC by baseline sample status

First post-baseline COC type*	Baseline sample Emergency (*n*=413)	General (*n*=431)	Total (*n*=844)
None	29.3	48.7	39.2
Emergency	53.0	37.6	45.1
General	16.7	11.4	14.0
Unknown	1.0	2.3	1.7

* (P<0.0001); χ^2 test

Table 4.57 presents the average time between the baseline CoC and the first CoC after baseline. Those in the emergency baseline sample who first returned for another emergency CoC returned within 8.6 months of their baseline care, compared to those in the general baseline sample who returned 15.6 months later for an emergency CoC after their baseline treatment.

Those in the emergency baseline sample who first returned for a general CoC returned within 8.3 months of their baseline treatment, compared to the general baseline sample who returned 22.5 months later for another general CoC following their baseline treatment. Patients who initially received an emergency CoC at baseline may already have been on a waiting list for general dental care at the time of the baseline study and consequently received a general course of care much sooner than the general baseline sample. Recall that those invited to participate as a general patient at baseline had to be new to the waiting list at the time of the baseline study, and so would not have been able to place their name on a waiting list until after their general baseline CoC. As a result, they did not receive a general CoC until much later in the follow-up period. Although the average length of the waiting list in SA was almost three years, waiting times varied between clinics and therefore 22.5 months represented an average of the varied waiting times at the different clinics at which patients in the study were enrolled.

Table 4.57: Average time taken to first return by baseline sample status and first post-baseline CoC

Baseline sample*	First post-baseline CoC type	N	Mean	SD
Emergency	Emergency	219	8.66	8.65
	General	69	8.32	10.17
	Unknown	4	3.25	3.56
General	Emergency	162	15.56	10.90
	General	49	22.51	10.72
	Unknown	10	6.78	6.36
Total	Emergency	381	11.59	10.25
	General	118	14.22	12.51
	Unknown	14	5.77	5.80

* (Baseline sample x first post-baseline CoC) P<0.01; UNIANOVA ($AdjR^2$=0.183)

Table 4.58 presents the distribution of the number of CoC received by patients in each baseline sample. There were significant differences between samples with regards to the number of CoC received during follow-up, with those in the emergency baseline sample receiving more CoC (0.75 times more or 73% more) on average.

Table 4.58: Distribution of the number of CoC received during the follow-up period by baseline sample status

	Baseline sample		
Number of CoC*	Emergency (*n*=413)	General (*n*=431)	Total (*n*=844)
0 CoC	29.3	48.7	39.2
1 CoC	21.5	21.3	21.4
2 CoC	15.5	10.9	13.2
3 CoC	11.9	9.0	10.4
4 CoC	9.4	5.1	7.2
5 CoC	3.1	1.9	2.5
6+ CoC	9.2	3.0	6.0

* (P<0.0001); χ^2 test

Table 4.59 presents the mean number of CoC received during the follow-up period for those who returned and across the total sample by baseline sample. For those that returned, an average of 3.1 CoC and 2.43 CoC was received by patients in the emergency and general baseline sample respectively. Across the total sample, emergency baseline patients received an average of 2.2 CoC and general baseline patients received an average of 1.3 CoC.

Table 4.59: Mean number of CoC received during the follow-up period for those who returned and across the total sample by baseline sample status

Baseline sample	Returned post-baseline*	All*
	n=292	*n*=413
Emergency	3.08 (2.53)	2.17 (2.55)
	n=221	*n*=431
General	2.43 (1.90)	1.25 (1.82)
	n=513	*n*=844
Total	2.80 (2.30)	1.70 (2.25)

** (P<0.0001); ANOVA

Table 4.60 presents the distribution of post-baseline CoC types for those who returned and across the total sample, each broken down by baseline sample status. Emergency dental care was predominately sought by patients in both the emergency and general baseline sample returning for care after baseline. However, a significantly greater proportion of patients in the emergency baseline sample received emergency care following their baseline treatment. In addition, a significantly greater proportion of patients in the emergency baseline sample also returned for a general CoC after baseline (see Table 4.60).

Table 4.60: Distribution of post-baseline CoC types for those who returned and across the total sample, each broken down by baseline sample status

	Returned post-baseline					All				
Post-baseline CoC type	Emergency baseline sample (*n*=292)		General baseline sample (*n*=221)			Emergency baseline sample (*n*=413)		General baseline sample (*n*=431)		
	n	%	*n*	%		*n*	%	*n*	%	
None	-	-	-	-		121	29.3	210	48.7	
Emergency*	261	89.4	183	82.8	**	261	63.2	183	42.5	***
General**	138	47.3	71	32.5	*	138	33.4	71	16.5	***
Unknown*	5	1.7	11	5.0	**	5	1.2	11	2.6	

*** (P<0.0001), ** (P<0.001), * (P<0.05); χ^2 test

Table 4.61 presents the average time between the date of the baseline CoC and the date the first post-baseline emergency and general CoC was received, broken down by baseline sample status. The average time taken for patients to return for an emergency CoC after their baseline CoC differed significantly between the emergency and general baseline samples, with those in the emergency baseline sample receiving an emergency CoC 8.6 months later, compared to those in the general baseline sample who returned for an emergency CoC 13.2 months after baseline. The average time taken for patients to return for a general CoC after baseline also differed significantly between the baseline samples, with emergency baseline patients returning for their first general CoC 19.0 months after baseline compared to an average time of 26.3 months for general baseline patients.

Table 4.61: Average time in months between the baseline CoC and the first emergency and general CoC received post-baseline by baseline sample status

Post-baseline CoC type		Baseline sample: Emergency	General	Total	
		n=261	*n*=183	*n*=444	
First emergency CoC	Mean	8.587	13.165	10.474	***
	SD	8.996	9.417	9.435	
	Min	0.033	0.230	0.033	
	Max	39.978	38.630	39.978	
		n=124	*n*=47	*n*=171	
First general CoC	Mean	19.016	26.289	21.015	***
	SD	12.540	10.037	12.314	
	Min	0.197	2.170	0.197	
	Max	40.603	40.307	40.603	

*** (P<0.0001); ANOVA

Presented in Table 4.62 is the distribution of the number of CoC received by type of CoC and sample. A significantly greater proportion of patients in the emergency baseline sample received one or more emergency CoC during the follow-up period, compared to those in the general baseline sample (63.2% cf. 42.5%). A similar trend was observed between samples for those receiving general care during the follow-up, with a significantly greater proportion of patients in the emergency baseline sample receiving one or more general CoC (33.4% cf. 16.5%).

Table 4.62: Number of CoC by CoC type and baseline sample status

Post-baseline CoC type by baseline sample	Number of post-baseline CoC 0 CoC	1 CoC	2 CoC	3 CoC	4 CoC	5 CoC	6+ CoC	
Emergency CoC*								
	n=152	*n*=97	*n*=57	*n*=47	*n*=22	*n*=8	*n*=30	
Emergency (*n*=413)	36.8	23.5	13.8	11.4	5.3	1.9	7.3	=63.2%
	n=248	*n*=80	*n*=39	*n*=36	*n*=15	*n*=3	*n*=10	
General (*n*=431)	57.5	18.6	9.0	8.4	3.5	0.7	2.3	=42.5%
	n=400	*n*=177	*n*=96	*n*=83	*n*=37	*n*=11	*n*=40	
Total (*n*=844)	47.4	21.0	11.4	9.8	4.4	1.3	4.7	=52.6%
General CoC[a]*								
	n=275	*n*=107	*n*=23	*n*=6	*n*=1	*n*=1	*n*=0	
Emergency (*n*=413)	66.6	25.9	5.6	1.5	0.2	0.2	–	=33.4%
	n=360	*n*=50	*n*=14	*n*=4	*n*=3	*n*=0	*n*=0	
General (*n*=431)	83.5	11.6	3.2	0.9	0.7	–	–	=16.5%
	n=635	*n*=157	*n*=37	*n*=10	*n*=4	*n*=1	*n*=0	
Total (*n*=844)	75.2	18.6	4.4	1.2	0.5	0.1	–	=24.8%

* (P<0.0001); χ^2 test

a χ^2 test conducted with 4 categories for number of CoC (0 CoC, 1 CoC, 2 CoC and 3+ CoC) in order to achieve no more than 25% of the cells with an expected count less than 5 (i.e., in order to comply with minimum cell size requirements)

Table 4.63 shows the average time between CoC for emergency and general baseline patients returning for care. Visit frequency was significantly different between samples, with greater time intervals between CoC for general baseline patients. The average time between CoC for emergency baseline patients was approximately 9 months, compared to 12.4 months for general baseline patients.

Table 4.63: Average time (in months) between the numbers of CoC received post-baseline by baseline sample status

Baseline sample[†*]		Average time between CoC (months) — Number of post-baseline CoC: 1 CoC[a]	2 CoC[b]	3 CoC	4 CoC	5 CoC	6+ CoC	Total
		(*n*=89)	(*n*=64)	(*n*=49)	(*n*=39)	(*n*=13)	(*n*=38)	(*n*=292)
Emergency	Mean	12.88	9.45	8.07	6.30	5.32	3.70	8.91
	SD	10.15	5.36	2.83	2.04	1.91	1.39	7.05
		(*n*=92)	(*n*=47)	(*n*=39)	(*n*=22)	(*n*=8)	(*n*=13)	(*n*=221)
General	Mean	16.839	12.700	8.716	6.986	6.101	3.377	12.364
	SD	11.719	4.877	3.284	2.160	1.040	0.898	9.166
		(*n*=181)	(*n*=111)	(*n*=88)	(*n*=61)	(*n*=21)	(*n*=51)	(*n*=513)
Total	Mean	14.89	10.83	8.36	6.55	5.62	3.62	10.40
	SD	11.12	5.39	3.04	2.09	1.65	1.28	8.20

* (P<0.0001); ANOVA

† for all CoC types

a time between baseline CoC & first post-baseline CoC

b time between baseline CoC & first post-baseline CoC and first & second post-baseline CoC. The same logic applies for those who had 3 CoC, 4 CoC 5 CoC and 6+ CoC

Table 4.64 shows the average time (in months) between the numbers of post-baseline CoC by post-baseline CoC type and baseline sample status. The average time period between post-baseline emergency CoC varied significantly between baseline samples, with those in the general baseline sample experiencing shorter intervals between numbers of emergency CoC received post-baseline.

Table 4.64: Average time (in months) between the numbers of post-baseline CoC by post-baseline CoC type and baseline sample status

Post-baseline CoC type by baseline sample		Average time between CoC (months) Number of post-baseline CoC 1 CoC	2 CoC	3 CoC	4 CoC	5 CoC	6+ CoC	Total
Emergency CoC*								
		(*n*=97)	(*n*=57)	(*n*=47)	(*n*=22)	(*n*=8)	(*n*=30)	(*n*=261)
Emergency	Mean	12.37	8.98	7.74	5.99	5.60	3.85	9.07
	SD	10.70	4.69	2.81	1.96	1.66	1.50	7.60
		(*n*=80)	(*n*=39)	(*n*=36)	(*n*=15)	(*n*=3)	(*n*=10)	(*n*=103)
General	Mean	–	9.405	8.097	5.870	4.559	3.154	7.685
	SD	–	7.758	4.601	2.951	2.853	0.873	5.923
		(*n*=97)	(*n*=96)	(*n*=83)	(*n*=37)	(*n*=11)	(*n*=40)	(*n*=364)
Total	Mean	12.37	9.15	7.90	5.94	5.32	3.68	8.68
	SD	10.70	6.09	3.68	2.37	1.95	1.40	7.19
General CoC*								
		(*n*=107)	(*n*=23)	(*n*=6)	(*n*=1)	(*n*=1)	(*n*=0)	(*n*=31)
Emergency	Mean	–	6.12	8.49	6.51	3.22	–	6.50
	SD	–	6.97	5.76	.	.		6.51
		(*n*=50)	(*n*=14)	(*n*=4)	(*n*=3)	(*n*=0)	(*n*=0)	(*n*=71)
General	Mean	24.92	13.37	9.42	7.60	–	–	21.04
	SD	10.36	4.17	3.65	0.89	–	–	10.81
		(*n*=50)	(*n*=37)	(*n*=10)	(*n*=4)	(*n*=1)	(*n*=0)	(*n*=102)
Total	Mean	24.92	8.86	8.86	7.33	3.22	–	16.62
	SD	10.36	6.98	4.81	0.90	.	–	11.78

* (P<0.0001); ANOVA

Table 4.65 presents the mean number of CoC per follow-up year by post-baseline CoC type and baseline sample status. CoC per follow-up year was calculated by dividing the total number of post-baseline CoC received by the patient for each particular post-baseline CoC type by the number of years followed. Patients in the emergency baseline sample had on average 0.75 CoC per follow-up year, compared to general baseline patients who had 0.42. Of those that returned, emergency baseline patients had significantly more emergency CoC per follow-up year compared to general baseline patients (0.94 cf. 0.76).

Table 4.65: **Mean number of CoC per follow-up year by post-baseline CoC type and baseline sample status**

	Baseline sample		Post-baseline CoC type			Totals	
			Emergency[a]	General	Unknown	Returned*	All
			n=261	*n*=138	*n*=5	*n*=292	*n*=413
CoC per year	Emergency	Mean	0.94	0.46	0.55	1.06	0.75
		SD	0.71	0.24	0.37	0.81	0.83
			n=183	*n*=71	*n*=11	*n*=221	*n*=431
	General	Mean	0.76	0.48	0.59	0.81	0.42
		SD	0.59	0.26	0.46	0.65	0.62

* (Baseline sample x returned post-baseline) P<0.01; UNIANOVA (AdjR^2=0.403)
a (P<0.01); ANOVA

Table 4.66 presents the mean number of visits per follow-up year by post-baseline CoC type and baseline sample status. Visits per follow-up year were calculated by dividing the total number of visits made by the patient post-baseline for each particular post-baseline CoC type by the number of years followed. Patients in the emergency baseline sample made significantly more visits per follow-up year, on average, for post-baseline emergency CoC than the patients in the general baseline sample (1.1 visits cf. 0.8 visits). Overall, for those that returned and across the total samples, those in the emergency baseline sample made more visits per follow-up year, on average, than those in the general baseline sample.

Table 4.66: **Mean number of visits per follow-up year by post-baseline CoC type and baseline sample status**

	Baseline sample		Post-baseline CoC type			Totals	
			Emergency[a]	General	Unknown	Returned*	All**
			n=261	*n*=138	*n*=5	*n*=292	*n*=413
Visits per year	Emergency	Mean	1.07	1.25	0.66	1.56	1.10
		SD	0.71	1.19	0.46	1.42	1.39
			n=183	*n*=71	*n*=11	*n*=221	*n*=431
	General	Mean	0.84	1.60	0.75	1.25	0.64
		SD	0.74	1.49	0.47	1.25	1.15

**(Baseline sample x all) P<0.001; ANOVA
*(Baseline sample x returned post-baseline) P<0.05; ANOVA
a (P<0.01); ANOVA

4.4.3.4 Service provision

Variables in the following analyses were main areas of services, which followed the Australian Dental Association's Schedule of Dental Services (1992). Because there were uneven follow-up periods for persons in the baseline sample, services received were converted to rates, i.e., mean number of services received per follow-up year (calculated by dividing the total number of services received (numerator) by the number of years followed (denominator)).

Distribution of services

The distribution of services between baseline samples regardless of follow-up CoC type showed that there were differences between the proportion of patients in the emergency baseline and general baseline sample in relation to the types of services received upon returning. These results are displayed in Table 4.67. A significantly greater proportion of emergency baseline patients who returned post-baseline were receiving oral surgery, endodontic, restorative and prosthodontic services, but significantly fewer were receiving periodontic services compared to patients in the general baseline sample. It would appear that the treatment needs of those patients who initially received emergency care at baseline were greater when they returned for subsequent treatment, whereas the treatment needs of those initially receiving a general course of care at baseline were not as complex/extensive.

Table 4.67: Distribution of services in main service areas across all post-baseline CoC types for those who returned and across the total sample by baseline sample status

	TOTALS (across all post-baseline CoC types)							
	Returned				All			
Main service area	Emergency baseline sample (*n*=292)	General baseline sample (*n*=221)	Total baseline sample (*n*=513)		Emergency baseline sample (*n*=413)	General baseline sample (*n*=431)	Total baseline sample (*n*=844)	
Diagnostic services	95.2	91.4	93.6		67.3	46.9	56.9	***
Preventive services	37.3	40.7	38.8		26.4	20.9	23.6	a
Periodontic services	3.8	10.9	6.8	**	**2.7**	**5.6**	4.1	*
Oral surgery services	**41.4**	**22.2**	33.1	***	**29.3**	**11.4**	20.1	***
Endodontic services	20.2	12.2	16.8	*	**14.3**	**6.3**	10.2	***
Restorative services	72.9	64.7	69.4	*	**51.6**	**33.2**	42.2	***
Crown/bridge services	2.1	1.8	1.9		1.5	0.9	1.2	
Prosthodontic services	14.0	8.1	11.5	*	9.9	4.2	7.0	**
Orthodontic services	–	–	–		–	–	–	
General/misc. services	30.1	28.5	29.4		21.3	**14.6**	17.9	*

*** (P<0.0001), ** (P<0.01), * (P<0.05); χ^2 test
a borderline significance, P=0.059

Table 4.68 shows the percentage of patients who had at least one service from the main service areas during the follow-up period, broken down by post-baseline CoC type and baseline sample status. Of those returning for an emergency course of care, a significantly greater proportion of emergency baseline patients received oral surgery services compared to general baseline patients. Of those returning for a general course of care, a significantly greater proportion of general baseline patients had periodontic services and general/miscellaneous services, whereas a significantly greater proportion of emergency baseline patients returning for general care had oral surgery services, endodontic services and restorative services.

Table 4.68: Distribution of services in main service areas by post-baseline CoC type and baseline sample status

	POST-BASELINE CoC								
	Emergency CoC			**General CoC**			**Unknown CoC**		
Main service area	Emergency baseline sample (*n*=261)	General baseline sample (*n*=183)		Emergency baseline sample (*n*=138)	General baseline sample (*n*=71)		Emergency baseline sample (*n*=5)	General baseline sample (*n*=11)	
Diagnostic services	94.6	94.0		92.8	90.1		–	45.5	
Preventive services	18.8	25.7		50.7	62.0		–	63.6	
Periodontic services	3.1	4.4		**2.2**	**23.9**	***	–	–	
Oral surgery services	**42.5**	**26.2**	***	**15.2**	**2.8**	**	–	–	
Endodontic services	17.2	13.7		**15.9**	**5.6**	*	–	9.1	
Restorative services	66.7	69.4		**59.4**	**36.6**	**	–	27.3	
Crown/bridge services	2.3	2.2		2.2	–		–	–	
Prosthodontic services	10.7	6.0		13.8	11.3		–	9.1	
Orthodontic services	–	–		–	–		40.0	–	
General/misc. services	28.7	24.6		**11.6**	**31.0**	**	60.0	–	

*** (P<0.0001), ** (P<0.01), * (P<0.05); χ^2 test

Table 4.69 presents the distribution of persons receiving one or more services within a service area by post-baseline CoC type across the total baseline sample of those who returned. Across the total sample of who returned, there were differences in the proportion of persons receiving particular services, depending on the type of CoC received (see Table 4.69). Compared to those returning for a general course of care, a significantly greater proportion of persons returning for an emergency CoC were receiving oral surgery services (35.8% cf. 11.0%), restorative services (67.8% cf. 51.7%) and general/miscellaneous services (27.0% cf. 18.2%), but a significantly smaller proportion were receiving preventive services (21.6% cf. 54.5%) or periodontic services (3.6% cf. 9.6%).

Table 4.69: Distribution of persons receiving one or more services within a service area by post-baseline CoC type across the total baseline sample of those who returned

	Post-baseline CoC type			
Main service area	Emergency (*n*=444)	General (*n*=209)	Total (*n*=653)	
Diagnostic services	94.4	91.9	93.6	
Preventive services	**21.6**	**54.5**	32.2	***
Periodontic services	**3.6**	**9.6**	5.5	**
Oral surgery services	**35.8**	**11.0**	27.9	***
Endodontic services	15.8	12.4	14.7	
Restorative services	**67.8**	**51.7**	62.6	***
Crown and bridge services	2.3	1.4	2.0	
Prosthodontic services	8.8	12.9	10.1	
Orthodontic services	–	–	–	
General/miscellaneous services	**27.0**	**18.2**	24.2	*

*** (P<0.0001), ** (P<0.01), * (P<0.05); χ^2 test

Table 4.70 shows the mean number of services received per follow-up year by main service area for patients in the emergency and general baseline sample who returned and also across each sample. Distributions reflect the volume of services provided in different service areas. Patients in the emergency baseline sample returning for subsequent treatment were receiving significantly less preventive and periodontic services per follow-up year and significantly more diagnostic, oral surgery, endodontic and restorative services than those patients in the general baseline sample who returned for care.

Table 4.70: Mean services per follow-up year in main service areas for those who returned and across the total sample by baseline sample status

Main service area		TOTALS (across all post-baseline CoC types) Returned post-baseline Emergency sample (*n*=292)	General sample (*n*=221)	Total sample (*n*=513)		All Emergency sample (*n*=413)	General sample (*n*=431)	Total sample (*n*=844)	
Diagnostic	Mean	1.508	1.078	1.323	***	1.066	0.553	0.804	***
	SD	1.242	1.023	1.171		1.250	0.909	1.119	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	8.354	6.563	8.354		8.354	6.563	8.354	
Preventive	Mean	0.190	0.570	0.354	***	0.135	0.292	0.215	**
	SD	0.305	1.496	1.025		0.271	1.107	0.817	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	2.032	12.335	12.335		2.032	12.335	12.335	
Periodontic	Mean	0.013	0.074	0.039	***	0.009	0.038	0.024	**
	SD	0.067	0.260	0.180		0.057	0.190	0.142	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	0.440	1.967	1.967		0.440	1.967	1.967	
Oral surgery	Mean	0.378	0.104	0.260	***	0.267	0.053	0.158	**
	SD	0.828	0.245	0.659		0.717	0.183	0.529	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	7.378	2.120	7.378		7.378	2.120	7.378	
Endodontic	Mean	0.197	0.085	0.149	*	0.139	0.044	0.091	**
	SD	0.632	0.318	0.523		0.539	0.231	0.414	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	6.200	2.796	6.200		6.200	2.796	6.200	
Restorative	Mean	1.143	0.590	0.905	***	0.808	0.303	0.550	***
	SD	1.503	0.706	1.254		1.366	0.585	1.073	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	10.302	3.147	10.302		10.302	3.147	10.302	
Crown/bridge	Mean	0.029	0.007	0.020		0.020	0.004	0.012	
	SD	0.270	0.058	0.207		0.227	0.041	0.162	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	3.793	0.633	3.793		3.793	0.633	3.793	
Prosthodontic	Mean	0.162	0.100	0.135		0.115	0.051	0.082	*
	SD	0.538	0.405	0.485		0.458	0.294	0.384	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	4.920	2.496	4.920		4.920	2.496	4.920	
Orthodontic	Mean	0.000	0.000	0.000		0.000	0.000	0.000	
	SD	0.000	0.000	0.000		0.000	0.000	0.000	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	0.000	0.000	0.000		0.000	0.000	0.000	
General/misc.	Mean	0.171	0.195	0.182		0.121	0.100	0.110	
	SD	0.372	0.484	0.424		0.322	0.360	0.342	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	3.286	3.282	3.286		3.286	3.282	3.286	
Total	Mean	3.793	2.805	3.367	**	2.681	1.438	2.046	***
	SD	3.350	3.163	3.304		3.303	2.662	3.055	
	Min	0.295	0.296	0.295		0.000	0.000	0.000	
	Max	27.898	19.326	27.898		27.898	19.326	27.898	

*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

Table 4.71 shows the mean number of services per follow-up year by main service area for patients returning for an emergency and/or general course of care. These distributions reflect not only the volume of services provided in different service areas, but also the degree of variation in service provision between different CoC types. Thus when the types of services received were broken down by CoC type, it was found that patients in the emergency baseline sample returning for an emergency CoC during the follow-up period received significantly more services per follow-up year on average than those patients in the general baseline sample. In particular, they received significantly more diagnostic, oral surgery, and restorative services but significantly less preventive services than those in the general baseline sample returning for an emergency care. Furthermore, emergency baseline patients returning for general CoC still received significantly less preventive services as well as periodontic and general services than general baseline patients. Instead, they received significantly more restorative services than general baseline patients when they returned for a general CoC.

Although a proportion of both the emergency and general baseline samples returned for an emergency CoC during the follow-up period, general baseline patients received significantly less services per follow-up year on average than emergency baseline patients. In particular, emergency baseline patients received significantly more extractions and restorative services on average.

Across samples, mean service rates showed that for patients returning for an emergency CoC, diagnostic, oral surgery services and restorative services dominated the distribution of services, while preventive services were provided at lower rates. For those receiving a general CoC, the distribution of services showed diagnostic, preventive and restorative services being provided at higher rates.

Table 4.71: Mean services per follow-up year by post-baseline CoC type and baseline sample status

Main service area		Post-baseline CoC type: Emergency CoC: Emergency sample (*n*=261)	General sample (*n*=183)	Total sample (*n*=444)		General CoC: Emergency sample (*n*=138)	General sample (*n*=71)	Total sample (*n*=209)	
Diagnostic	Mean	1.216	0.950	1.106	**	0.892	0.867	0.883	
	SD	1.002	0.801	0.933		0.813	1.129	0.929	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	6.050	6.040	6.050		6.200	6.563	6.563	
Preventive	Mean	0.079	0.140	0.104	*	0.253	1.309	0.612	***
	SD	0.180	0.309	0.243		0.313	2.370	1.485	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	0.948	2.157	2.157		1.693	12.335	12.335	
Periodontic	Mean	0.011	0.016	0.013		0.007	0.191	0.069	***
	SD	0.064	0.075	0.068		0.044	0.400	0.251	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	0.440	0.431	0.440		0.318	1.823	1.823	
Oral surgery	Mean	0.310	0.120	0.232	***	0.213	0.014	0.145	a
	SD	0.579	0.258	0.483		0.903	0.085	0.740	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	4.909	2.120	4.909		7.378	0.607	7.378	
Endodontic	Mean	0.113	0.070	0.095		0.203	0.057	0.154	b
	SD	0.395	0.221	0.335		0.665	0.244	0.562	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	4.609	1.864	4.609		5.812	1.452	5.812	
Restorative	Mean	0.774	0.575	0.692	*	0.955	0.326	0.742	***
	SD	1.014	0.636	0.882		1.427	0.624	1.249	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	5.615	3.147	5.615		9.687	2.948	9.687	
Crown/bridge	Mean	0.019	0.009	0.015		0.025	0.000	0.017	
	SD	0.175	0.063	0.140		0.199	0.000	0.162	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	2.626	0.633	2.626		2.020	0.000	2.020	
Prosthodontic	Mean	0.080	0.045	0.066		0.174	0.187	0.179	
	SD	0.279	0.226	0.259		0.544	0.577	0.554	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	2.237	1.905	2.237		3.443	2.373	3.443	
Orthodontic	Mean	0.000	0.000	0.000		0.000	0.000	0.000	
	SD	0.000	0.000	0.000		0.000	0.000	0.000	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	0.000	0.000	0.000		0.000	0.000	0.000	
General/misc.	Mean	0.152	0.109	0.134		0.068	0.327	0.156	***
	SD	0.317	0.282	0.303		0.271	0.686	0.471	
	Min	0.000	0.000	0.000		0.000	0.000	0.000	
	Max	2.987	3.020	3.020		2.325	3.282	3.282	
Total	Mean	2.755	2.033	2.457	***	2.790	3.278	2.956	
	SD	2.301	1.822	2.144		2.826	3.913	3.235	
	Min	0.291	0.296	0.291		0.286	0.290	0.286	
	Max	16.133	13.806	16.133		24.411	19.326	24.411	

*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA
a borderline significance, P=0.066; b borderline significance, P=0.075

4.4.3.5 Attendance behaviour patterns

Table 4.72 shows the percentage of people in each baseline sample receiving various combinations of CoC types during the follow-up period by those that returned and across the total sample. Of those that returned, 52.4% of the emergency baseline sample and 63.8% of the general baseline sample received emergency care only, 9.9% of patients in the emergency baseline sample and 14.5% of patients in the general baseline sample received general care only, and 36.0% of emergency baseline patients and 16.7% of general baseline patients received both emergency and general care when returning for subsequent treatment after the baseline study. Across the total sample, the attendance behaviour for 69.4% of patients in the emergency baseline sample (i.e., across the total emergency baseline sample, 37.0% emergency + 7.0% general + 25.4% emergency and general) and 48.7% of patients in the general baseline sample (i.e., across the total general baseline sample 32.7% emergency + 7.4% general + 8.6% emergency and general) who returned for treatment could be ascertained.

Table 4.72: Distribution of patients according to their dental attendance behaviour during the follow-up period (based on the types of post-baseline CoC received) for those who returned post-baseline and across the total baseline sample by baseline sample status

	Returned post-baseline***			All***		
Dental attendance during follow-up (based on CoC type)	**Emergency sample (*n*=292)**	**General sample (*n*=221)**	**Total sample (*n*=513)**	**Emergency sample (*n*=413)**	**General sample (*n*=431)**	**Total sample (*n*=844)**
None	NA	NA	NA	29.3	48.7	39.2
Emergency	52.4	63.8	57.3	37.0	32.7	34.8
General	9.9	14.5	11.9	7.0	7.4	7.2
Emergency and General	36.0	16.7	27.7	25.4	8.6	16.8
Unknown	0.3	2.3	1.2	0.2	1.2	0.7
Emergency and Unknown	–	1.8	0.8	–	0.9	0.5
General and Unknown	0.3	0.5	0.4	0.2	0.2	0.2
Emergency, General and Unknown	1.0	0.5	0.8	0.7	0.2	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

*** (P<0.0001); χ^2 test
NA Not applicable

Overview of attendance patterns

Definite attendance patterns emerged for 58.8% (or n=497) of the baseline participants followed (69.4% (or n=287) emergency baseline patients and 48.7% (or n=210) general baseline patients). These participants were therefore able to be classified as either an emergency attender, general attender or both an emergency and general attender (see Table 4.73).

As for those who did not return for dental care during the follow-up period, determining their dental attendance behaviour becomes somewhat impossible. The only available information on these particular persons is the nature of their course of care at baseline. If they are classified according to their baseline CoC, there is a risk of misclassifying them. Consequently, those who did not return, along with those who had any unknown post-baseline CoC types, remained unclassified.

Table 4.73: Summary table: Actual dental attendance behaviour during the follow-up by baseline sample status

	Baseline sample					
Dental attendance during follow-up (based on post-baseline CoC types)	**Emergency (n=413)**		**General (n=431)**		**Total (n=844)**	
	n	%	n	%	n	%
Emergency	153	37.0	141	32.7	294	34.8
General	29	7.0	32	7.4	61	7.2
Emergency and General	105	25.4	37	8.6	142	16.8
Total	**287**	**69.4**	**210**	**48.7**	**497**	**58.8**

4.5 Summary

This section provides a summary of the patterns of behaviour and service provision within each of the baseline samples. In addition, a summary of the observed differences between the emergency and general baseline samples is provided. Significant differences are identified, as are the directions of these differences. The type of information gathered and examined during the follow-up period for each baseline sample related to their experience of disease at the start of the follow-up period, the length of the follow-up period, the proportion returning for care post-baseline, the time taken to return for subsequent dental care post-baseline and the frequency of dental attendance post-baseline, the number and types of CoC received post-baseline, and the types of and quantity of services received. Based on the longitudinal follow-up of patients receiving an emergency CoC at baseline or a general CoC at baseline, the following results were observed.

Emergency baseline sample

A large proportion of patients returned for care post-base-line (70.7%). An initial examination of disease experience within this sample revealed that those who returned had fewer decayed teeth (1.35 D_3 teeth cf. 1.57 D_3 teeth) but significantly more missing (9.04 M teeth cf. 7.25 M teeth) and filled teeth (9.67 F teeth cf. 6.26 F teeth) than non-returners. Patients in the emergency baseline sample returned for care after their baseline CoC within a reasonably short period of time (72.6% returned within the first year, an average of 8.5 months after their baseline care). The majority of patients who returned within this sample first returned for an emergency CoC post-baseline (75%). This pattern of attendance continued into the follow-up period, with the majority of emergency baseline patients continuing to visit for emergency dental care (89.4% of those that returned, or 63.2% of the total sample). For those patients who returned for dental care post-baseline, they returned, on average, within 8.6 months for their first emergency CoC post-baseline, and within 19.0 months for their first general CoC post-baseline. The average number of CoC received for those that returned post-baseline was 2.8, representing an average of 3.1 emergency CoC and 2.4 general CoC. The average time between CoC for patients within this sample was 8.9 months, and when broken down by the type of CoC received, the average time between multiple emergency and general CoC was 9.1 months and 7.5 months respectively.

Within this sample, services received varied according to the nature of the CoC sought. When returning for emergency dental care, fewer patients were receiving preventive services, while a greater proportion were receiving oral surgery services when compared to the distribution of services as part of a general course of care. Post-baseline CoC type aside, for those that returned post-baseline, diagnostic, preventive, oral surgery and restorative services were received by 95.2%, 37.3% 41.4% and 72.9% respectively. In terms of the mean number of services received, diagnostic, oral surgery and restorative services were provided at higher rates and periodontic and prosthodontic services were provided at lower rates for those returning for emergency dental care, and for those returning for general dental care, diagnostic, preventive and restorative services were provided at higher rates.

Dental attendance behaviour was based on the nature of the courses of care received during the follow-up period, and it was found that within this baseline sample, 52% of those who returned post-baseline attended for emergency dental care only, while just fewer than 10% returned for general care.

General baseline sample

Some 51.3% of patients within the general baseline sample returned for care post-baseline. Those in the general sample who returned had, on average, slightly more decayed teeth (0.59 D_3 teeth cf. 0.53 D_3 teeth) and more missing teeth (7.65 M teeth cf. 6.74 M teeth) and significantly more filled teeth (10.49 F teeth cf. 8.36 F teeth) than non-returners. Of those who returned post-baseline, 40.3% returned within the first year, an average of 16.7 months after their baseline care. Of those that returned, the majority first returned for an emergency CoC post-baseline (73.3%). This pattern of attendance continued into the follow-up period, with the majority of general baseline patients continuing to visit for emergency dental care (82.8% of those that returned, or 42.5% of the total general baseline sample). For those patients who returned for dental care post-baseline, they returned, on average, within 13.2 months for their first emergency CoC post-baseline, and within 26.3 months for their first general CoC post-baseline. The average number of CoC received for those that returned post-baseline was 1.7, representing an average of 2.2 emergency CoC and 1.3 general CoC. The average time between CoC for patients within this sample was 12.4 months, and when broken down by the type of CoC received, the average time between multiple emergency and general CoC was 7.7 months and 26.1 months respectively.

The service distribution within this sample varied for those who received an emergency CoC and for those who received a general CoC. Compared to those receiving a general CoC post-baseline, fewer patients returning for emergency CoC received preventive and orthodontic services, while a greater proportion received general/miscellaneous services. Post-baseline CoC type aside, for those that returned post-baseline, diagnostic, preventive, restorative and general/miscellaneous services were provided to a greater proportion of patients within the sample, with these services received by 91.4%, 40.7%, 64.7% and 28.5% of patients. Mean service rates showed that, for general baseline participants returning for emergency CoC, diagnostic, preventive, oral surgery and restorative services dominated the distribution of services, while periodontic and prosthodontic services were provided at lower rates. For those receiving general CoC post-baseline, diagnostic, preventive, restorative and prosthodontic services were provided at higher rates.

As was the case for the emergency baseline sample, dental attendance behaviour was based on the nature of the courses of care received during the follow-up period. For the general baseline sample, 63.8% of those who returned post-baseline attended for emergency dental care only, while almost 7% returned for general care.

Emergency and general baseline samples

Differences in disease experience (as at the beginning of the follow-up period) between the baseline samples by post-baseline dental attendance status were found. In particular, among those who returned, emergency baseline patients had significantly more decayed teeth (1.35 D_3 teeth cf. 0.59 D_3 teeth) and missing teeth (9.04 M teeth cf. 7.65 M teeth) than those in the general sample. Among those who did not return, patients in the emergency sample had significantly more decayed teeth (1.57 D_3 teeth cf. 0.53 D_3 teeth) and significantly fewer filled teeth (6.26 F teeth cf. 8.36 F teeth) than patients in the general sample.

There were also distinct differences in the observed patterns of behaviour and service provision between the emergency and general baseline samples during the follow-up period. In particular,

- a greater proportion of patients from the emergency baseline sample returned for dental care post-baseline compared to those in the general baseline sample (70.7% cf. 51.3%);
- for those that returned post-baseline, patients in the emergency baseline sample returned within a shorter period, on average, than patients in the general baseline sample (within 8.5 months cf. 16.7 months);
- for those receiving an emergency CoC as their first post-baseline baseline CoC, patients in the emergency baseline sample returned sooner, on average, than general baseline patients (within 8.7 months cf. 15.6 months);
- of those that returned post-baseline, a greater proportion of patients in the emergency baseline sample returned within the first year of having their baseline treatment, compared to those patients in the general baseline sample (72.6% cf. 40.3%);
- emergency baseline patients receiving an emergency CoC post-baseline returned within a shorter period of time after their baseline care compared to general baseline patients (8.6 months cf. 13.2 months after baseline);
- the average time taken for patients to return for a general CoC after baseline also was shorter for emergency baseline patients than general baseline patients (19.0 months cf. 26.3 months after baseline);
- emergency baseline patients received more CoC on average than general baseline patients during the follow-up period (0.75 times more). For those that returned post-baseline, emergency baseline patients received on average 3.1 CoC while general baseline patients received an average of 2.4 CoC;
- patients in the emergency baseline sample were visiting more frequently than patients in the general baseline sample. The average time between CoC for emergency baseline patients was 8.9 months, compared to 12.4 months for general baseline patients;
- across the total baseline samples irrespective of post-baseline CoC type, a significantly greater proportion of emergency baseline patients were receiving diagnostic services (94.4% cf. 91.9%), oral surgery services (35.8% cf. 11.0%), endodontic services (15.8% cf. 12.4%), restorative services (67.8% cf. 51.7%), prosthodontic services (8.8% cf. 12.9%) and general/miscellaneous services (27.0% cf. 18.2%), but fewer were receiving periodontic services (3.6% cf. 9.6%) and preventive services (21.6% cf. 54.5%) compared to general baseline patients;

- in comparison to general baseline patients returning for an emergency CoC, emergency baseline patients also returning for an emergency CoC received, on average, significantly more diagnostic services per follow-up year (1.22 cf. 0.95), oral surgery services per follow-up year (0.31 cf. 0.12) and restorative services per follow-up year (0.77 cf. 0.58) but significantly less preventive services per follow-up year (0.08 cf. 0.14);
- in comparison to general baseline patients returning for a general CoC, emergency baseline patients also returning for a general CoC received, on average, significantly more oral surgery services per follow-up year (0.21 cf. 0.01) and restorative services per follow-up year (0.96 cf. 0.33) but significantly less preventive services per follow-up year (0.25 cf. 1.31), periodontic services per follow-up year (0.01 cf. 0.19) and general/miscellaneous services per follow-up year (0.07 cf. 0.33); and
- in terms of the dental attendance behaviour of the baseline samples, the majority of patients who returned in each baseline sample were returning for emergency dental care (52.4% of those in the emergency baseline sample and 63.8% of those in the general baseline sample).

These results are presented as a summary in Table 4.74.

Table 4.74: Summary of significant differences in patterns of behaviour and service provision between the emergency and general baseline samples during the follow-up period

Variable description	Emergency baseline sample Sig.	Direction	Description	Reference†
1. Follow-up period	P<0.0001	↓	Shorter for E patients	General baseline sample
2. Proportion returning post-baseline	P<0.0001	↑	Greater % of E patients	
3. Period of time taken to return post-baseline	P<0.0001	↓	Shorter period for E patients	
4. Proportion first returning for emergency CoC	P<0.0001	↑	Greater % of E patients	
5. Number of post-baseline CoC	P<0.0001	↑	Greater number of CoC received by E patients	
6. Proportion receiving emergency care post-baseline	P<0.0001	↑	Greater % of E patients	
7. Proportion receiving general care post-baseline	P<0.0001	↑	Greater % of E patients	
8. Mean number of emergency CoC per follow-up year	P<0.01	↑	Higher for E patients	
9. Frequency of visiting post-baseline	P<0.0001	↑	E patients returned more frequently with shorter return intervals between CoC	
10. Distribution of services for those who returned post-baseline				
- Periodontic	P<0.01	↓	Received by a smaller % of E patients	
- Oral surgery	P<0.0001	↑	Received by a greater % of E patients	
- Endodontic	P<0.05	↑	Received by a greater % of E patients	
- Restorative	P<0.05	↑	Received by a greater % of E patients	
- Prosthodontic	P<0.05	↑	Received by a greater % of E patients	
11. Distribution of services within post-baseline emergency CoC				
- Oral surgery	P<0.0001	↑	Received by a greater % of E patients	
12. Distribution of services within post-baseline general CoC				
- Periodontic	P<0.0001	↓	Received by a smaller % of E patients	
- Oral surgery	P<0.01	↑	Received by a greater % of E patients	
- Endodontic	P<0.05	↑	Received by a greater % of E patients	
- Restorative	P<0.01	↑	Received by a greater % of E patients	
- General/miscellaneous	P<0.01	↓	Received by a smaller % of E patients	
13. Mean number of services per follow-up year for those returning post-baseline				
- Diagnostic	P<0.0001	↑	Higher for E patients	
- Preventive	P<0.0001	↓	Lower for E patients	
- Periodontic	P<0.0001	↓	Lower for E patients	
- Oral surgery	P<0.0001	↑	Higher for E patients	
- Endodontic	P<0.05	↑	Higher for E patients	
- Restorative	P<0.0001	↑	Higher for E patients	
- Total	P<0.01	↑	Higher for E patients	

† General baseline sample is the comparison group
↑ higher; ↓ lower
E Emergency baseline sample
G General baseline sample

Table 4.76 *continued*

Variable description	Emergency baseline sample Sig.	Direction	Description	Reference†
14. Mean number of services per follow-up year for those returning post-baseline for an emergency CoC				General baseline sample
- Diagnostic	P<0.01	↑	Higher for E patients	
- Preventive	P<0.05	↓	Lower for E patients	
- Oral surgery	P<0.0001	↑	Higher for E patients	
- Restorative	P<0.05	↑	Higher for E patients	
- Total	P<0.0001	↑	Higher for E patients	
15. Mean number of services per follow-up year for those returning post-baseline for a general CoC				
- Diagnostic				
- Preventive	P<0.0001	↓	Lower for E patients	
- Periodontic	P<0.0001	↓	Lower for E patients	
- Restorative	P<0.0001	↑	Higher for E patients	
- General/miscellaneous	P<0.0001	↓	Lower for E patients	

† General baseline sample is the comparison group
↑ higher; ↓ lower
E Emergency baseline sample
G General baseline sample

4.6 Discussion

Access to adequate dental care appears to be hindered by an under-resourced public dental system characterised by long waiting times and little capacity for it to handle anything other than emergencies (COTA, 1998). The length of the public dental waiting list for general care in South Australia reached 35 months (as of mid-2004) (Chartier A, personal communication, August 2004), so the majority of cardholders end up accessing dental services when an emergency or problem arises. As a result, many adult public dental patients tend to be caught in a cycle of emergency care, receiving dental treatment that alleviates the immediate problem, but which is clearly substandard in terms of their long-term oral health. During the follow-up, an unfavourable pattern of visiting and service provision emerged, with the majority of the sample followed receiving emergency care, highlighting access problems to dental care within the public dental system.

During the follow-up period, both a proportion of emergency and general baseline patients returned for care, with the majority returning for emergency care during the follow-up period. However, what differentiates these two baseline samples is the frequency with which they returned and the type of services received. Emergency baseline patients returned sooner and received more CoC on average during the follow-up period, and a greater proportion was receiving extractions. General baseline patients were requiring care less frequently and also later in the follow-up period. This may indicate that those receiving a general CoC at baseline received more comprehensive care initially and so their experience of problems later on was substantially less. Thus if more comprehensive and preventive dental care is provided at less frequent intervals, the resources involved may be similar, if not less, to that used to treat patients cycling through emergency care (Spencer, 2001). The end result, however, would be better oral health outcomes. In a study conducted by Powers et al. (2000), it was found that those who did not receive routine preventive treatment were more likely to use emergency dental services, highlighting the importance of appropriate access to and use of preventive dental services.

The findings from this research also showed inequalities in service provision among patients attending for an emergency CoC or general CoC. Emergency baseline patients and general baseline patients returning for the same type of CoC (i.e., an emergency or general CoC) received very different services. For instance, those in the emergency baseline sample receiving an emergency CoC at subsequent visits received less preventive services but significantly more oral surgery and restorative services than general baseline patients also returning for an emergency CoC. Similarly, when both samples returned for a general CoC, the emergency baseline sample were still receiving significantly less preventive services as well as periodontic and general/miscellaneous services than those in the general baseline sample. Instead, they were receiving more oral surgery and restorative services than the general baseline sample who were also returning for a general CoC. This perhaps represents some sort of carry over effect from earlier CoC. The results presented in this chapter highlight that those who used dental services mainly for emergency dental care were worse off when (and even after) a general course of care was finally offered to them. A lack of receipt of preventive services at emergency visits, as well as a lack of appropriate management of existing oral health problems and general maintenance of their oral health, may have contributed to their deteriorating oral health status. At baseline (see Section 3), for example, emergency baseline patients were found to have worse periodontal conditions but ended up receiving less periodontic services at subsequent dental visits, perhaps partly because their oral health had deteriorated to a point where extractions were seen to be the only solution (and perhaps explains findings that showed those in the emergency baseline sample receiving significantly more extractions during the follow-up period). Although emergency dental care is designed to be predominately treatment–focused, it is evident that merely fixing the problem does not appear to be adequately serving the oral health needs of many public dental patients, and ultimately leaves them vulnerable for further problems later on. This raises concerns about the appropriateness of services offered as part of emergency courses of care. If the types of services people received as part of an emergency and general CoC are considered, overall, the service-mix for those attending for a general CoC was one which fostered a more preventive and maintenance approach to oral health care and may be more preferable to the services offered as part of an emergency CoC in terms of achieving good oral health in the long-term. Effective intervention strategies with a particular focus on creating better access to general dental services to reduce the burden of future disease are therefore needed to address these issues.

In conclusion, longitudinal analyses have demonstrated that the SA public dental system is characterised by high levels of emergency care and extraction of teeth. A large proportion of patients from the baseline emergency sample subsequently visiting for general care were receiving higher rates of extractions and restorative services which perhaps limited the extent of preventive services provided. Among the emergency sample there appeared to be an accumulation of unmet dental needs. This was certainly the case after the baseline treatment was provided, where it was shown that those in the emergency baseline sample walked away with more untreated decay than those in the general baseline sample (see section 3.5.7.1). At the time of follow-up, the emergency baseline sample started from a position of worse oral health status (evident from higher decayed teeth scores than the general baseline sample after baseline treatment), so services provided to this sample as part of a general course of care were those which presumably attended to deteriorating oral health problems which could not perhaps be resolved through the provision of preventive dental services. Comparison between baseline samples indicated inequalities in service patterns, with the less desirable service pattern for emergency baseline patients perhaps not being unexpected, considering the differences between their oral health status at baseline. Brennan and Spencer (1999) in their evaluation of a public-funded dental program found similar service provision patterns among those attending public dental services for emergency dental care, and commented that even if the proportion of patients visiting public dental services for emergency care remained fairly constant, 'improvements in service patterns could be achieved if there was less of a back-log of unmet need' (p146).

If inequalities in oral health are to be diminished, public dental care has to become an equitable service that fulfils the needs of all eligible persons. The reliance on emergency care and the non-availability of preventive care may reinforce a pattern of dental care that contributes to the inequalities in oral health. It is uncertain whether patient attitudes or beliefs or structural factors within the public dental system are shaping patients' dental attendance patterns. Hence, in the following chapter, dental visiting behaviour will be examined from the patient's perspective to determine what factors influence and determine the way that they end up using the public dental service. Factors such as attitudes, perceived social pressure and behavioural control factors will be considered to elucidate the decision-making process surrounding dental visiting.

5 Dental beliefs, values and attitudes

Regular, preventive dental attendance is a contributor to the oral health status of people of all ages. Studies have shown that preventive dental care leads to better oral health outcomes and gains in quality of life (McGrath and Bedi, 2001). However, while the positive effects of regular, preventive dental visiting are well established in all age groups, there is evidence to demonstrate that many people do not attend the dentist regularly enough for preventive dental care associated with oral health benefits. This is particularly the case for adults with lower socioeconomic status in the Australian population. In order to help understand health behaviours, social cognitive models have been developed and adopted in behavioural science research. These models endeavour to identify and explain how expectations, judgments, beliefs and intentions lead to the performance of various behaviours (Hagger, 2001b). The adoption of such models may lead to identifying the necessary targets for intervention to positively affect the dental visiting behaviour of minority groups of adults within the Australian population.

5.1 Introduction

Research has shown that beliefs, attitudes, and knowledge; physical and social environments; and skill or control over performance of behaviours determine and limit health behaviours (Bandura, 1986; Leventhal, Zimmerman and Gutmann, 1984; Tedesco, Keffer and Fleck-Kandath, 1991).

An understanding of the cognitions surrounding use of dental services is needed in order to promote more effective and efficient oral health care to those in need. A widely used social cognition model is the Theory of Planned Behaviour (TPB) (Ajzen, 1988, 1991). The theory has been used successfully to provide a better understanding and explanation of a diverse range of health-related and social behaviours (Conner and Sparks, 1996; Godin and Kok, 1996; Armitage and Conner, 2001). There is substantial empirical evidence which supports the TPB across a range of health behaviours, including addictive behaviours (e.g., smoking, alcohol consumption and drug use), clinical and screening behaviours (e.g., health checks and cancer screening), eating behaviours (e.g., healthy diets), exercising behaviours, HIV/AIDS-related behaviours (e.g., condom use) and oral hygiene behaviours (e.g., brushing and flossing teeth). Godin and Kok (1996) reviewed 58 health behaviour studies and found that, on average, the model explained 41% of the variance in intention and 34% of the variance in behaviour.

This model postulates that behaviour is predicted by intention to perform the behaviour and also by perceived behavioural control when behaviour is not under complete volitional control. Intention to perform the behaviour is determined by the relative importance of attitude toward the behaviour (i.e., a favourable or unfavourable evaluation of the behaviour), subjective norm (i.e., perceived social pressure to perform or not to perform the behaviour) and perceived behavioural control (i.e., self-efficacy and controllability in relation to the behaviour). With its emphasis on personal beliefs and attitudes, perceived social expectations, and self-efficacy concerns, the TPB seemed particularly appropriate for studying the factors that influence public dental service use.

Reasons for and factors influencing use of dental services are complex, combining social, psychological, knowledge and economic factors. Although dental beliefs, values and attitudes are influential factors on dental visiting behaviour, research has also attributed dental visiting behaviour to the systemic and environmental contexts (i.e., societal conditions and social contexts) that individuals function in rather than solely to their self-interest-determined behaviour. These findings present a view that situational constraints dictate behaviour. As such, behaviour is shaped by contextual factors that are subject to only limited control by the individual. So although TPB focuses on subjective psychological determinants, the theory in no way denies the importance of objective environmental factors that place a burden on individuals, such as poor social networks, finances/poverty or poor health. The theory assumes, however, that factors of this kind influence behaviour indirectly by affecting attitudes, subjective norms and perceived behavioural control.

While a number of studies have adopted the TPB in the prediction of various clinical and screening behaviours, there have been few, if any, empirical studies using the TPB in the area of dental visiting among adults. Nevertheless, there is an abundant amount of research evidence into various other health behaviours to indicate that the TPB may be a useful framework to explain the cognitive influences of adults' dental visiting intentions and behaviour. This chapter examines the roles of people's beliefs, values and attitudes toward using public dental services in SA. A better account of the attitudinal factors that contribute to positive decisions to use the dental service can broaden our understanding of dental attendance among adults, and this information can assist in the preparation of effective intervention strategies aimed at promoting preventive dental attendance visits.

5.1.1 Objectives of the research

This examination of dental visiting behaviour is intended to help policy makers better understand what motivates a person to use public dental services. Which factors are important in determining whether or not a person will use dental services/visit the dentist? To what degree do these factors result from our system of care (delivery system) in the public sector, and to what degree from other determinants? How can understanding determinants of dental visiting behaviour assist us in improving our oral health care system? In addressing these questions, this component of the thesis focuses on persons who are, or have been in the past, eligible for public-funded dental care.

In summary, this research sets out to address the following questions:

1. What factors or determinants affect the willingness and ability of adults eligible for public-funded dental care to use dental services?

2. Having assessed the use of public dental services to date and having gained a better understanding of what factors determine dental visiting behaviour, what can be done to affect the underlying beliefs and perceptions of patients in order to influence behaviour in support of regular/preventive dental visiting?

Ideally, the answers to these questions will provide more information about what motivates people and affects their behaviour. In this way, current policies relating to the use of dental services (and the provision of dental services) can be assessed and improvements suggested.

5.1.2 The theoretical model

The TPB examines the role of people's attitudes, social pressure, perceptions of control and intentions in explaining/predicting behaviour. This model postulates that the best determinant of a particular behaviour is behavioural intention and also perceived behavioural control when a behaviour is not under complete volitional control.

TPB can thus be applied in the context of patients' dental visiting behaviour as follows:

1. A patient's dental visiting behaviour can be predicted from his or her intention to visit the dentist and perceptions of behavioural control.
2. This intention is a function of three basic determinants:
   - ***Attitudes*** – a patient's positive or negative evaluation of the outcomes of dental visiting (i.e., the dental visit will lead to specific outcomes and these outcomes are of particular value to him or her);
   - ***Subjective norms*** – a patient's perception of the social pressure to visit or not to visit the dentist (i.e., visiting the dentist will please or be approved of by specific people whose opinion is important to him or her); and
   - ***Perceived behavioural control*** – a patient's perception of the extent to which visiting the dentist is within his or her control (for example, he or she will have available the resources perceived as facilitators to visit the dentist, i.e., the perceived ease or difficulty of performing the behaviour which is assumed to reflect past experience as well as anticipated barriers and obstacles).

Attitudes, subjective norms and perceived behavioural control form the core of the TPB. It is these three factors that are hypothesised to affect the willingness and ability of patients to visit the dentist. The relative importance of these three factors will vary across behaviours and situations, and not all of the factors may be required to accurately predict behaviour. The relationship between the determinants and intentions and behaviour are depicted graphically in Figure 5.1.

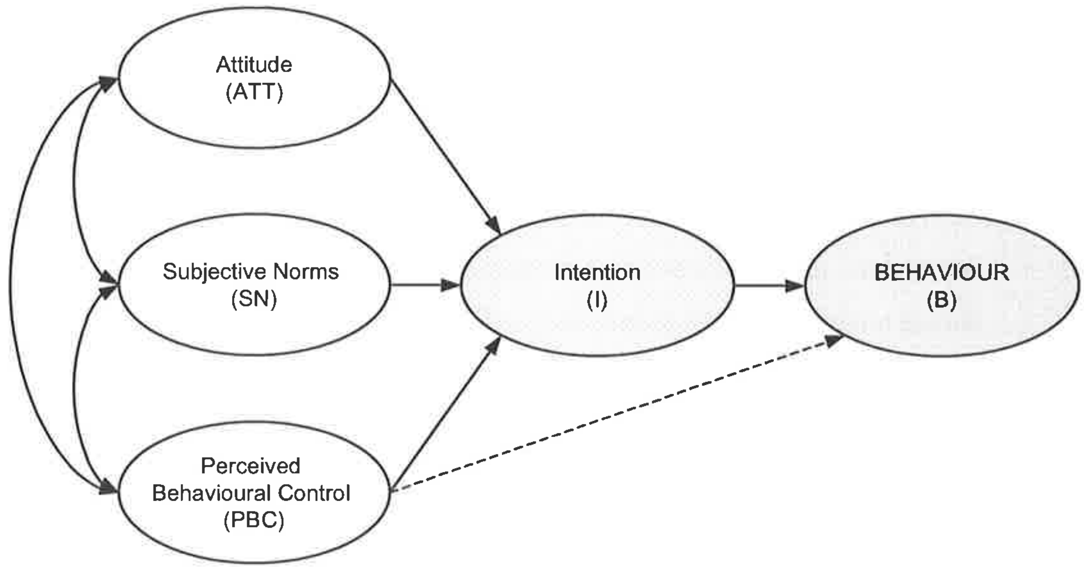


Figure 5.1: The theory of planned behaviour (Ajzen, 1991)

5.1.3 Outline of the chapter

This chapter will discuss the key concepts of the TPB model and also detail how each of the components of the model were measured and subsequently used to test the model. More specifically, this chapter will discuss both the qualitative and quantitative methods employed to operationalise the TPB. The following steps, which were undertaken to construct a questionnaire to measure the variables in the TPB, will be discussed in more detail in this chapter:

1. defining the behaviour of interest in terms of its target, action, context and time;
2. generating appropriate direct measures of intention, attitude, subjective norm and perceived behavioural control;
3. determining the most frequently perceived advantages and disadvantages of performing the behaviour;
4. determining the most important people who would or would not support the performance of the behaviour; and
5. determining the perceived barriers or facilitating factors that could make the behaviour more difficult or easier to perform.

5.2 Explaining dental visiting

5.2.1 The TPB model

As discussed in Section 5.1.2, the TPB model posits that three factors – attitudes, subjective norms, and perceived behavioural control – directly affect behavioural intentions, and thus indirectly affect behaviour. The two factors attitudes and subjective norms do not directly influence behaviour; however, this model posits that perceived behavioural control does. Attitudes, subjective norms, and perceived behavioural control in the context of this research are described below.

5.2.1.1 Attitudes

Attitudes are determined by the benefits (or harm) perceived by patients to result from visiting the dentist. Patients will tend to have a positive attitude toward dental visiting if there is a perceived positive outcome, or a negative attitude if there is a perceived negative outcome to visiting the dentist.

5.2.1.2 Subjective norms

Subjective norms is a function of a respondent's beliefs about the normative views and wishes of referents about their behaviour with respect to dental visiting, and their motivation to comply with the views and wishes of each particular referent. Referents are individuals or groups who may have an effect on a patient's decisions or actions (e.g., friends, family, neighbours, community groups, and so forth). Patients will tend to have positive subjective norms if there is perceived positive social pressure to visit the dentist or negative subjective norms if there is perceived negative social pressure to visiting the dentist.

5.2.1.3 Perceived behavioural control

The perceived behavioural control factor measures the effects of facilitating or inhibiting factors that can control a patient's behaviour with respect to visiting the dentist.

5.3 Determinants of attitudes, subjective norms and perceived behavioural control

The TPB postulates that behaviour is a function of beliefs or information relevant to the behaviour. In general, beliefs about a behaviour are formed by associating it with various characteristics, qualities and attributes. Consequently, attitudes toward the behaviour are acquired. In a similar fashion, individuals associate their skills, resources, time, and so forth, to the level of control they have over a behaviour. In addition, the perceived social pressure to perform the behaviour is also an important consideration to an individual when making a decision to engage in a particular behaviour.

Thus, the three key factors – attitudes, subjective norms, and perceived behavioural control – are traced to corresponding sets of behaviour-related beliefs, or subfactors, that reflect the underlying cognitive structure. Three such beliefs can be distinguished:

1. ***behavioural beliefs,*** which are assumed to influence attitudes toward the behaviour (i.e., beliefs about the likely outcomes of the behaviour and the evaluations of these outcomes);
2. ***normative beliefs,*** which constitute the underlying determinants of subjective norms (i.e., beliefs about the normative expectations of others and motivation to comply with these expectations); and
3. ***control beliefs,*** which provide the basis for perceptions of behavioural control (i.e., beliefs about the presence of factors that may facilitate or impede performance of the behaviour and the perceived power of these factors).

These sets of beliefs, or subfactors, are also examined to better understand why individuals do or do not use dental services. For example, attitudes stem from evaluations of potential consequences that can result from performing the behaviour. If the underlying behavioural beliefs, or subfactors, related to these consequences are favourable, a favourable attitude results and an individual is likely to visit the dentist. The TPB will therefore be used to analyse the relative affects of attitudes, subjective norms, and perceived behavioural control on patients' dental visiting behaviour.

Application of the TPB to dental visiting behaviour among adults eligible for public-funded dental care leads to a behavioural model that identifies the factors influencing individual decisions, explains and potentially predicts individual behaviour, and allows the development of policy recommendations related to the use of dental services.

5.4 Operationalising the TPB

5.4.1 The behaviour criterion

When obtaining measures of each of the components of the TPB, it is important to develop a clear conceptualisation of the behaviour of interest. Once the behaviour of interest is selected, it must be defined in terms of its action, target (i.e., the target at which the action is directed), context (i.e., the context in which it occurs) and time (i.e., the time at which it is performed). Each element can be specified at any level, from the very general to the very specific. The behaviour of interest in this research was visiting the dentist. Thus, the behaviour was defined in terms of its four elements: 1) action – visiting the dentist; 2) target towards which the action is directed – the public dentist; 3) context (or setting) – at a public dental clinic; and 4) time – during the eligibility period.

The time element used for this research was very general/broad. This research was primarily interested in persons using/attending the public dental service as an eligible adult. The timeframe here therefore encompassed the time period in which a person was eligible to use public dental services (i.e., a dental visit could potentially be made any time up until the expiry date of their government concession card). Intentions, attitudes, subjective norms and perceived behavioural control were subsequently measured within this time period.

To optimise the relationship between attitudes, subjective norms, perceived behavioural control, intentions and behaviour, it is important to follow the principle of compatibility (Sutton, 1998; Ajzen, 2002). The principle of compatibility states that 'in order to maximise the predictive power, the predictor (intention) and the criterion (behaviour) should be measured at the same level of specificity' (Sutton, 1998; p1327) in terms of its action, target, context and time. Ajzen (2002) maintains that no matter how the four elements, target, action, context and time, are specified it is critical that all the constructs in the TPB (i.e., attitudes, subjective norms, perceived behavioural control and intentions) be defined in terms of exactly the same elements.

5.4.2 Measuring attitudes, subjective norms and perceived behavioural control

In behavioural research, explicit measures of attitudes, subjective norms and perceived behavioural control either rely on direct inquiries about attitudes, subjective norms or perceived behavioural control in relation to the behaviour or infer respondents' evaluations from their expressions of behavioural, normative or control beliefs about the behaviour.

Thus, attitudes, subjective norms and perceived behavioural control can be measured in two ways, through

1. Global (or direct) measures, and
2. Belief-based (or indirect) measures.

For each component in the TPB (i.e., attitudes, subjective norms and perceived behavioural control), both global and belief-based measures were assessed. Note also that in the TPB, global measures of intentions (but not belief-based measures) were also obtained.

5.4.2.1 Global measures

Global measures incorporate the assessment of all relevant beliefs. This can be done by using single items on a questionnaire asking respondents to judge each predictor (i.e., intentions, attitudes, subjective norms and perceived behavioural control) on a set of scales.

Global measures are used to test and estimate the behavioural model because they are assumed to have greater reliability as they incorporate the assessment of all relevant beliefs. Such measures, however, do not allow the examination of underlying subfactors and their role in the formation of attitudes, subjective norms and perceived behavioural control. Belief-based measures do allow the examination of underlying subfactors and will be discussed in the next section.

5.4.2.2 Belief-based measures

In addition to the global measures, attitudes, subjective norms and perceived behavioural control can also be measured indirectly on the basis of corresponding beliefs, suitably referred to as belief-based measures. Beliefs are assumed to provide the cognitive and affective foundations for attitudes, subjective norms, and perceptions of behavioural control. As such, they play a central role in the TPB. By measuring beliefs we can, theoretically, gain insight into the underlying cognitive foundation, i.e., we can explore why people hold certain attitudes, subjective norms, and perceptions of behavioural control.

While a person can hold a large number of beliefs about a particular behaviour, their attitudes, subjective norms and perceptions of behavioural control toward a particular behaviour are primarily determined by their salient beliefs about the behaviour – beliefs which stand out against all others. Since people may hold different salient beliefs, and the number of salient beliefs may differ from person to person, it is difficult to obtain a precise measure of beliefs determining a given individual's attitudes, subjective norms and perceived behavioural control using a standardised measurement scale (i.e., a standardised attitude scale, subjective norm scale and perceived behavioural control scale). However, an approximation can be made of modal salient beliefs within a given population. This can be done by asking a sample of the population of interest to state their beliefs about a behaviour in free response. The beliefs occurring with the greatest frequency are then considered modal salient beliefs and form the core of the questionnaire survey.

Construction of the belief-based measures of attitudes, subjective norms, and perceived behavioural control therefore first requires the identification of important or relevant outcomes, referents, and control factors respectively. Pilot work is required to identify salient accessible behavioural, normative and control beliefs (i.e., subfactors). Salient accessible beliefs are assumed to account for attitudes toward the behaviour, accessible normative beliefs for subjective norms, and accessible control beliefs for perceived behavioural control. Hence, by measuring beliefs there is an opportunity to gain a better understanding of how the globally measured attitudes, subjective norms and perceived behavioural control are formed, i.e., what sorts of beliefs play an important role in determining attitudes, subjective norms and perceived behavioural control.

5.5 Data collection tools

A multi-method research approach (involving both qualitative and quantitative research methods) was used to collect and analyse the data necessary to answer the questions outlined in the 'objectives of the research' (Section 5.1.1).

The first method involved a series of structured interviews with patients eligible for public-funded dental care (i.e., a qualitative research approach). The patients selected for these interviews had similar characteristics to those of the baseline sample (i.e., they were adults eligible for public-funded dental care attending for either emergency or general dental care). These interviews provided data and observations related to views about using the dental service. These interviews were then used to develop the second phase of data collection – a comprehensive questionnaire that was administered to the baseline sample. The questionnaire was designed to provide data on dental visiting behaviour and on the various factors and underlying subfactors postulated to affect behaviour. The questionnaire was constructed based on the methodology described by Ajzen (1988, 1991). These data allowed for the empirical testing of the TPB model.

5.5.1 Rationale for the use of qualitative research

Qualitative interviews in the form of structured interviews with adults eligible for public-funded dental care were used to collect anecdotal information in relation to opinions about and experiences with using the public dental services. Qualitative research is ideal for exploratory research because it provides a broad perspective on issues (Rice and Ezzy, 2000). There is an opportunity to explore thoughts, experiences and knowledge of public dental patients, which are relevant to the research being undertaken (Krueger, 1988). Qualitative research is guided by questions, issues and a search for patterns rather than a strict hypothesis. This is particularly important since the goal of this research was to understand the use of and improve dental services based on the opinions and expectations expressed by adult public dental patients.

The next section details the methods used to design and conduct the interviews of patients, including a description of the relevant outcomes, referents and control factors identified through the structured interview process. These outcomes, referents and controls were used to build the questionnaire items for collecting data in the questionnaire stage.

5.5.2 Interview process

The construction of belief-based measures first required the identification of important or relevant outcomes, referents and control factors. This identification process was based on interviews with adults eligible for public-funded dental care. There were three objectives to the interviews. These were:

1. to develop a better understanding of dental service use;
2. to gather preliminary data of dental visiting behaviour; and
3. to identify relevant outcomes, referents and control factors related to dental visiting.

All interviews conducted followed a structured topic guide. In this way the questions were asked the same way each time (see Table 5.1). This structured topic guide was developed based on the theoretical framework of the TPB. Some 20 structured interviews were conducted to elicit qualitative data regarding beliefs about visiting the dentist or using the public dental service, social influences on dental visiting behaviour, and other factors influencing the use of dental services or dental visiting. Interviewees were questioned about:

1. the advantages and disadvantages of visiting the dentist in order to identify relevant outcomes of visiting the dentist;
2. individuals or groups who would approve and/or disapprove of them visiting the dentist, or who might have any other influence on this behaviour, in order to identify relevant referents; and
3. what factors might facilitate or hinder them from visiting the dentist in order to identify relevant control factors.

All interviews were conducted at the Adelaide Dental Hospital (ADH). Patients waiting for either their emergency or general dental care appointment were approached. The interviews lasted approximately 10 to 15 minutes. Prior to the start of the interview, the aims of the interview were explained (i.e., that the purpose behind the interviews was to gain an understanding of perceptions of visiting a public sector dentist and using the public dental service). Approval to conduct the interviews was given by the Acting Executive Director of SADS.

Eliciting behavioural beliefs	
Q1	What do you believe are the advantages of visiting a public dentist?
Q2	What do you believe are the disadvantages of visiting a public dentist?
Q3	Is there anything else you associate with visiting a public dentist?
	Other questions…
Q4	What sorts of things do you think contribute to good oral health?
Q5	What sorts of things do you think contribute to bad oral health?
Q6	Are there any other things you can think of?
Eliciting normative referents	
Q1	Are there any individuals or groups who would approve of you visiting a public dentist?
Q2	Are there any individuals or groups who would disapprove of you visiting a public dentist?
Q3	Are there any individuals or groups who come to mind when you think about visiting a public dentist?
Eliciting control factors	
Q1	What factors or circumstances make it easier for you to use the public dental service/visit a public dentist?
Q2	What factors or circumstances make it more difficult for you to use the public dental service/visit a public dentist?
Q3	Are there any other issues that come to mind when you think about using the public dental service/visiting a public dentist?

Table 5.1: Details of the structured topic guide to elicit qualitative data regarding beliefs about visiting the dentist

5.5.3 Interview results

The primary purpose of the interviews was to generate a list of salient relevant outcomes, referents and controls for use in the development of a questionnaire to be distributed to the baseline sample. This section presents the results of the interview process.

5.5.3.1 Relevant outcomes

In the interviews a total of 18 outcomes were identified by patients as relevant to dental visiting (see Table 5.2). Responses given regarding the advantages of visiting the dentist included preventing tooth decay, keeping one's teeth healthy, preventing future dental problems, keeping one's teeth looking good, preventing pain in one's teeth, mouth or dentures, maintaining good oral health, receiving preventive treatments, having one's teeth cleaned, receiving necessary fillings, preventing tooth loss, receiving dental advice from a dental professional and getting any dental problems fixed. Receiving unnecessary fillings, having to wait a long time in the waiting room for one's designated appointment, not being seen promptly, experiencing painful dental treatment, and being dentally anxious or afraid were among the disadvantages of visiting the dentist, as identified by those persons interviewed.

Based on these outcomes, corresponding questionnaire items were developed to measure the _outcome evaluations_ and _outcome beliefs_ of whether a respondent thinks the outcome is either important or unimportant, or good or bad (as appropriate), and whether the outcome is likely or unlikely.

Table 5.2: Table of relevant outcomes important for determining attitudes as identified from the structured interviews

1.	Prevent tooth decay
2.	Keep teeth healthy
3.	Prevent future problems with teeth, mouth or dentures
4.	Keep teeth looking good
5.	Prevent pain in teeth, mouth or dentures
6.	Have good oral health
7.	Receive preventive treatments
8.	Have teeth cleaned
9.	Receive fillings to fix dental decay
10.	Receive unnecessary extractions
11.	Prevent loss of teeth
12.	Receive dental advice from a dental professional
13.	Get dental problems fixed if there were any problems to be fixed
14.	Have to wait a long time in the waiting room for the appointment
15.	Experience painful dental treatment
16.	Seen promptly
17.	Afraid about the dental visit
18.	Anxious about the dental visit

5.5.3.2 Relevant referents

Based on the interviews, five referents – family, parent/s, partner, mother and friends – were identified as being important to patients in their decision to visit the dentist (see Table 5.3). For each of these referents, questionnaire items were designed to measure _normative beliefs_ and _motivations to comply_, that is, whether a respondent thinks a given referent will approve or disapprove of them visiting the dentist and whether the referent is perceived as important or unimportant in their decision to visit the dentist.

Table 5.3: Referent groups important for determining subjective norms as identified from the structured interviews

1.	Family
2.	Partner
3.	Parent/s
4.	Mother
5.	Friend/s

5.5.3.3 Relevant controls

Respondents to the interviews identified factors that were viewed as preventing or facilitating their use of public dental services (see Table 5.4). These factors included long waiting lists, cost associated with dental treatment, having a bad dental experience, not being able to choose the treating dentist, being afraid or anxious and clinic location. Based on these control factors, corresponding questionnaire items were developed to measure *control beliefs* and *control power* of whether a respondent thought the control factor would make it easy or difficult for them to visit the dentist and whether the control factor was likely or unlikely.

Table 5.4: Table of relevant controls important for determining perceptions of control as identified from the structured interviews

1.	Long waiting lists
2.	Costly dental treatment
3.	Having to pay a gap, i.e., co-payments
4.	Bad dental experience
5.	Not having choice of dentist
6.	Being afraid about the dental visit
7.	Being anxious about the dental visit
8.	Convenient location of dental clinic
9.	Having to pay for dental treatment, regardless of the amount

5.5.4 The questionnaire

The questionnaire, which was preceded by face-to-face interviews, was administered as part of a cross-sectional dental behaviour survey. The information about relevant outcomes, referents and control factors identified in the interview process was used to construct an original questionnaire for distribution to the baseline sample. This questionnaire was designed and used as the primary data collection method for this study. It was designed specifically to measure the factors included in the TPB model, namely dental visiting intentions, attitudes, subjective norms and perceived behavioural control.

The questionnaire contained items that could be used to derive global and belief-based measures of attitudes, subjective norms and perceived behavioural control. In the case of intentions, only items allowing for the derivation of a global measure of intention were used in the questionnaire.

Prior to sending the questionnaire to the baseline sample, the questionnaire was successfully piloted on a similar group of subjects (n=30) to ensure its understandability and readability, as well as direct relevance to the purpose. Piloting the questionnaire provided a guide for how participants perceived and responded to questions. No major problems were encountered at this pilot stage. The following section details the derivation of global and belief-based measures.

5.5.4.1 Derivation of global measures

The four major constructs of the TPB – intentions, attitudes, subjective norms and, perceived behavioural control – were each assessed by means of several direct questions/statements. Responses to direct questions/statements were obtained by using a set of 7-point bipolar rating scales on which respondents were asked to rate their opinion in relation to various questions/statements about dental visiting. For example,

It is mostly up to me whether I visit the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree

This particular scaling methodology, commonly referred to as the semantic differential technique, was developed by Osgood, Suci and Tannenbaum (1957) to measure latent concepts. Snider and Osgood have suggested that the use of terms such as 'strongly (or extremely)', 'moderately (or quite)' and 'slightly' as 'linguistic quantifiers have been associated with more or less equal degrees of intensity' (Snider and Osgood 1969; p67). Thus, this ordinal data collection method results in approximately interval data that allow these variables to be examined using various statistical analytical techniques, such as descriptive statistics, correlations, factor analysis, regression analysis and so forth.

For the purpose of analysis and interpretation, scales were scored consistently so that higher scores reflected stronger intention to visit the dentist, a more positive attitude toward visiting the dentist, greater perceived positive social pressure to visit the dentist and a greater level of control over visiting the dentist. Within each scale, the mean of the item scores was calculated to give an overall intention score, attitude score, subjective norm score and perceived behavioural control score.

Global measure of intentions

Global measures of intentions should capture a person's overall intentions to perform the behaviour in question. This was done by asking respondents to indicate what their intentions were with regards to performing the behaviour, in this case visiting the dentist. Two items were used to assess intentions to visit the dentist. Participants indicated on 7-point disagree-agree scales to what extent they *wanted to* and *planned to* visit the dentist.

Global measure of attitudes

Global measures of attitudes should capture a person's overall evaluation of performing the behaviour in question. Respondents are usually asked to evaluate the behaviour on several bipolar adjective (i.e., pairs of opposites) scales. In the questionnaire, attitudes toward '*My visiting the dentist would be…*' were assessed by means of three evaluative semantic differential scales. The anchors of these scales were: harmful-beneficial, unpleasant-pleasant, and worthless-worthwhile. Both instrumental items (i.e., whether visiting the dentist achieved something, e.g., worthless-worthwhile) and experiential items (i.e., how it felt to visit the dentist, e.g., unpleasant-pleasant) were used.

A global attitude measure incorporates the assessment of all relevant outcome beliefs and outcome evaluations. It is for this reason that it is considered to be the most reliable measure of attitudes. Such measures however, do not allow the examination of the underlying subfactors - outcome beliefs and outcome evaluations - and their role in attitude formation. Belief-based measures do allow the examination of underlying subfactors and will be discussed in the next section.

Global measure of subjective norms

Global measures of subjective norms should capture a person's perceptions of others' level of endorsement of the behaviour. Three items were used to assess subjective norms with respect to visiting the dentist. Respondents were asked to indicate on 7-point disagree-agree scales the extent to which they believe that most people who are important to them *think they should* visit the dentist, *would approve* of them visiting the dentist, and *want them to* visit the dentist.

Global measure of perceived behavioural control

A direct measure of perceived behavioural control should capture a person's confidence that they are capable of performing the behaviour in question. This measure can be obtained by using items that capture both a person's sense of self-efficacy with respect to performing the behaviour and their beliefs about the behaviour's controllability.

Self-efficacy items should relate to the difficulty of performing the behaviour, or the likelihood that the person can do it (i.e., how confident they are that they can perform the behaviour). Two items were used to assess self-efficacy; these were: '*For me to visit the dentist from now on would be…*' using a 7-point difficult-easy scale and '*What is the likelihood of you visiting the dentist from now on?*' using a 7-point unlikely-likely response format scale.

Other items used to assess perceived behavioural control refer to the behaviour's controllability. These particular items address people's beliefs that they have control over the behaviour, and that its performance is or is not up to them. Four items were used to measure the behaviour's controllability; these were: '*Whether or not I visit the dentist is entirely up to me*', '*It is mostly up to me whether I visit the dentist…*', '*I have complete control over whether or not I visit the dentist…*', and '*There are factors outside my control that could prevent me from visiting the dentist…*'. A 7-point disagree-agree response format was used for each of these four items.

The distinction between perceived behavioural control and self-efficacy

As discussed earlier, perceived control over performing the behaviour and self-efficacy comprise the two components of the perceived behavioural control construct in the TPB. This construct was added to the TRA model to enhance the prediction of non-volitional behaviours (Ajzen, 1991). At the time, Ajzen proposed that both self-efficacy and perceived behavioural control were 'concerned with perceived ability to perform a behaviour (or consequence of behaviours)' and combined them into one construct. Research by others, however, has demonstrated that self-efficacy and perceived behavioural control are in fact quite distinct and the potential shortcomings in combining these two conceptually different attributes into the one construct has been documented (Hagger et al., 2001a; Terry and O'Leary, 1995; Povey et al., 2000). Trafimow et al. (2002) further demonstrated the distinction between the two constructs and also determined through meta-analyses that self-efficacy was generally better at predicting intentions and behaviour (i.e., self-efficacy has the capacity to predict intentions alone, behaviour alone, or both intentions and behaviour), although some exceptions were noted. Essentially, self-efficacy relates to the ease or difficulty of performing the behaviour, or the likelihood that a person can perform the behaviour. On the other hand, perceived control over performing the behaviour addresses a person's beliefs that they have control over the behaviour and that its performance is within their control. Terry and O'Leary (1995) and Armitage and Conner (1999) are among the researchers who suggest and support the notion that self-efficacy reflects internal aspects of control (i.e., a person's abilities with respect to visiting the dentist) whereas perceived control reflects external aspects of control (i.e., barriers toward visiting the dentist). An example of an internal factor is a person's perceived level of dental anxiety when visiting the dentist, and an example of an external factor is a barrier like cost of dental treatment. Given the substantial empirical evidence supporting the multi-dimensional nature of the perceived behavioural control construct, subsequent analyses will take into account these considerations and, if warranted, the perceived behavioural control component in the TPB will be represented as two distinct components, namely self-efficacy and perceived control.

5.5.4.2 Derivation of belief-based measures

As discussed in Section 5.3, beliefs represent the information an individual has about a particular behaviour. A belief links a behaviour to some attribute of it. Each belief is operationalised and measured by a procedure which places it along a dimension of subjective probability linking the behaviour and some related attribute. Associated with each of these attributes is an implicit evaluative response associated with the behaviour of interest. The basic survey measuring attitudes, subjective norms and perceived behavioural control therefore consisted of two parts:

1. *belief statements*, whereby each belief is accompanied by response choices using a 7-point Likert scale, e.g., strongly disagree-moderately disagree-slightly disagree-neither disagree nor agree-slightly agree-moderately agree-strongly agree, or some similar 7-point framework. Choices are numerically anchored from -3 to +3 or 1 to 7 to promote equal psychological intervals between responses;

2. *an evaluation of each attribute*, in which attributes should be evaluated for each belief that is measured. A Likert scale is employed to measure the affective component of attitudes, subjective norms and perceived behavioural control toward the behaviour. Response choices are again numerically anchored from -3 to +3 or 1 to 7.

The belief-based measure of attitudes, subjective norms and perceived behavioural control were be derived by examining each of these components for each of the respective attributes identified from the structured interviews. Following is a detailed description of how this was done for each of the belief-based cognitive measures.

Belief-based measure of attitudes

The belief-based measurement of attitudes is composed of two subfactors:

1. *Outcome evaluation* (e), defined as how important/unimportant or good/bad a potential outcome resulting from visiting the dentist is assessed to be (i.e., the desirability or otherwise of a particular outcome); and
2. *Outcome belief strength* (b), which is one's perception of how likely/unlikely it is that visiting the dentist will result in a given outcome (i.e. the likelihood of particular outcome occurring).

In order to obtain a belief-based measure of attitudes, two questions were asked with respect to each of the 18 outcomes of visiting the dentist (listed in Table 5.2).

First, participants were asked to evaluate each of the 18 outcomes on a 7-point unimportant-important scale or a good-bad scale as appropriate. Outcome evaluation was scored in a bipolar fashion, ranging from -3 (unimportant, bad) to +3 (important, good).

To access the outcome belief strength, participants were asked to rate the likelihood that visiting the dentist would produce each of the 18 outcomes on a 7-point unlikely-likely scale. Again, belief strength was scored in a bipolar fashion, ranging from –3 (unlikely) to +3 (likely).

The outcome belief strengths and outcome evaluations for the different beliefs provide substantive information about the attitudinal considerations that guide people's decisions to perform or not to perform in the behaviour under consideration.

An example of a behavioural belief and corresponding evaluation item is shown in Figure 5.2. This example considers the first relevant outcome listed in Table 5.2, 'Prevent tooth decay'.

- Evaluation of the belief, e_1

Preventing tooth decay is…	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important

- Outcome belief strength, b_1

I think that by visiting the dentist I will…

…prevent decay in my teeth?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely

Figure 5.2: An example of a behavioural belief and corresponding evaluation item: 'Preventing tooth decay'

The assessment of a single outcome, and its contribution to attitudes toward the behaviour, in this case dental visiting, is given by the product of its outcome evaluation and outcome belief strength (i.e., the *b x e* product). Belief-based measures are constructed by summing the products of outcome beliefs and outcome evaluations for all possible (or measurable) outcomes involved in attitude formulation to produce a composite 'Attitudes towards the behaviour' score.

Thus, a belief-based measure of attitudes was obtained by multiplying outcome evaluation and outcome belief strength measures, and then summing the resulting products over the i=1,…,18 beliefs, i.e.,

$$\text{Att} = \sum_{i=1}^{n=18} b_i e_i$$

where Att = belief-based attitudes score,

b_i = strength of the belief that the behaviour will produce outcome i,

e_i = evaluation of outcome i, and

i = i^{th} belief.

This is an expectancy-value model (i.e., behavioural beliefs represent the 'expectancy' component and outcome evaluations the 'value' component) whereby the subjective value of a given outcome affects attitudes in direct proportion to the strength of the belief.

As there were 18 items, the possible range of total scores was –162 to +162 (i.e., (3 x ±3) x 18). Using this scoring method, a score of zero represented neutral attitude, a positive (+) attitude score indicated that the participant had a favourable attitude toward dental visiting, and a negative (–) attitude score indicated that the participant held an unfavourable attitude toward visiting the dentist. Differences in range between these predictor variables are acceptable for correlational analyses; however, in order to compare the absolute values of predictor variables within the study, the mean of the multiplied scores was calculated (i.e., possible range of mean values is –9 to +9) (Francis et al., 2004).

A limitation to this approach is that researchers must identify all relevant outcomes and measure the underlying subfactors associated with them. Since the identification of all possible outcomes and measurement of associated behavioural beliefs is virtually impossible to do in practice, belief-based measures of attitudes are considered to be less reliable than global measures of attitude. The correlation between global and belief-based measures of attitudes can be computed to determine the strength of the association between the two measures. If they are perfectly correlated (i.e., correlation = 1) then both measures are judged to be interchangeable and equally reliable.

Belief-based measure of subjective norms

The belief-based measurement of subjective norms is composed of two subfactors:

1. *Normative belief strength* (nb), an assessment of the extent to which referents would support dental visiting (i.e., beliefs about the extent to which referents would approve or disapprove of them visiting the dentist); and
2. *Motivation to comply* (mc), a personal assessment of how motivated one is to comply with these same referents.

In order to obtain a belief-based measure of subjective norms, two items were asked with respect to each of the 5 referents (listed in Table 5.3). One item assesses normative belief strength and the other motivation to comply.

First, participants were asked to indicate whether they thought each particular referent would approve or disapprove of them visiting the dentist, and secondly, the extent to which they want to comply with each referent. Normative belief strength was scored in a bipolar fashion, ranging from –3 (disapprove) to +3 (approve), whereas motivation to comply was scored in a unipolar fashion, ranging from +1 (not at all) to +7 (very much).

Measures of normative belief strength and motivation to comply with respect to each accessible referent offer a 'snapshot' of perceived normative pressures in a given population.

An example of a measure of normative belief strength and corresponding motivation to comply is shown in Figure 5.3. This example considers the first referent listed in Table 5.3, 'Family'.

- Normative belief strength, nb_1

To what extent would the following people disapprove or approve of you visiting the dentist?

Your family	Strongly disapprove	Moderately disapprove	Slightly disapprove	Neither disapprove or approve	Slightly approve	Moderately approve	Strongly approve	NA

- Motivation to comply, mc_1

Generally speaking, I would like to do what my family thinks I should do.	Not at all	1	2	3	4	5	6	7	Very much	NA

Figure 5.3: An example of a measure of normative belief strength and corresponding motivation to comply: 'Family'

The impact of a single referent on the subjective norms of a respondent is considered to be the product of the normative belief about that referent and the motivation to comply with that referent (i.e., the *nb x mc* product). A positive *nb x mc* product indicates that combined beliefs contribute to a subjective norm (referent influence) that is supportive of dental visiting; a negative *nb x mc* product indicates the opposite.

The belief-based measure of subjective norms was constructed by summing the products of normative beliefs and motivation to comply (i.e., *nb x mc* products) for all possible referents involved in subjective norm formulation to produce a composite 'Subjective norms' score.

Thus, an individual's belief-based subjective norms toward dental visiting is defined simply as the summation of all relevant *nb x mc* products, i.e.,

$$Sn = \sum_{j=1}^{n=5} nb_j mc_j$$

where Sn = belief-based subjective norms score,

nb_j = normative belief strength,

mc_j = motivation to comply with referent j, and

n = number of relevant referents

j = j^{th} referent = 1,…,n.

As there were 5 items, the possible range of total scores was –105 to +105 (i.e., (7 x ±3) x 5). Using this scoring method, a score of zero represented no perceived social pressure to visit the dentist, a positive (+) subjective norms score indicated that the participant experienced social pressure to visit the dentist, and a negative (–) subjective norms score indicated that the participant experienced social pressure not to visit the dentist. As with the belief-based attitude score, differences in range between these predictor variables are acceptable for correlational analyses; however, in order to compare the absolute values of predictor variables within the study, the mean of the multiplied scores was calculated (i.e., possible range of mean values is –21 to +21) (Francis et al., 2004).

As is the case for belief-based attitude measures, the identification of all possible referents and measurement of associated normative beliefs is impossible to do in practice, so belief-based measures of subjective norms are considered to be less reliable than global measures of subjective norms. If, however, both measures are highly correlated, they are considered to be interchangeable and equally reliable.

Belief-based measure of perceived behavioural control

In the TPB, one's perceived behavioural control in relation to dental visiting behaviour is defined as one's assessment of how difficult or easy it is to carry out the given behaviour. A number of factors – individual, environmental and system – can make dental visiting easier or harder to perform. The belief-based measurement of perceived behavioural control is the assessment of these various control factors, and in theory is composed of two subfactors:

1. *Control belief strength* (c), an assessment as to whether or not a given control factor makes it harder or easier to visit the dentist, and
2. *Control power* (p), an assessment of the strength of the given control power in actually affecting behaviour.

In order to obtain a belief-based measure of perceived behavioural control, two items were asked with respect to each of the 8 control factors (listed in Table 5.4). One item assessed control belief strength and the other control power.

First, respondents were asked to rate on a 7-point difficult-easy scale their beliefs about each of the factors in terms of how difficult or easy each factor would make visiting the dentist. Control beliefs were scored in a bipolar fashion, ranging from -3 (difficult) to +3 (easy). To assess the power of the control belief, respondents are asked the extent to which they disagreed or agreed that each factor would be an issue when visiting the dentist. Again, control power was scored in a bipolar fashion, ranging from –3 (strongly disagree) to +3 (strongly agree).

Examination of the strength and power of the different control beliefs provides a picture of the factors that are viewed as facilitating or impeding the performance of the behaviour.

An example of a measure of control belief strength and corresponding control belief power is shown in Figure 5.4. This example considers the first control factor listed in Table 5.4, 'Long waiting lists'.

- Control belief strength, c_1

How difficult or easy would the following make visiting the dentist?

Long waiting lists	Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy

- Power of control factor, p_1

If I were to visit the dentist I expect that...

...there would be long waiting lists.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree

Figure 5.4: An example of a measure of control belief strength and corresponding control belief power: 'Long waiting lists'

The impact of a single control factor on perceptions of behavioural control is measured by the product of the control belief strength and the power of the control factor (i.e. , the *c x p* product). A positive c *x p* product indicates that a given control factor is thought to facilitate dental visiting behaviour. A negative product indicates that a control factor is thought to constrain dental visiting behaviour.

The belief-based measure of perceived behavioural control was constructed by summing the products of control belief strength and control power for all possible control factors involved in the formulation of perceived behavioural control to produce a composite 'Perceived behavioural control' score.

Thus, an individual's belief-based perceived behavioural control toward dental visiting is defined simply as the summation of all relevant *c x p* products, i.e.,

$$\text{Pbc} = \sum_{k=1}^{n=8} c_k p_k$$

where Pbc = belief-based perceived behavioural control score,

c_k = control belief strength,

p_k = power of control factor k,

n = number of relevant control factors

k = k^{th} referent = 1,...,n.

As there were 8 items, the possible range of total scores was –72 to +72 (i.e., (3 x ±3) x 8). Using this scoring method, a score of zero indicated that the participant was impartial about their beliefs about the control they have over visiting the dentist, a positive (+) perceived behavioural control score indicated that the participant felt in control over visiting the dentist, and a negative (–) perceived behavioural control score indicated that the participant did not feel in control over visiting the dentist. As with the previous two belief-based measures, differences in range between these predictor variables are suitable for correlational analyses; however, in order to compare the absolute values of predictor variables within the study, the mean of the multiplied scores was calculated (i.e., possible range of mean values is –9 to +9) (Francis et al., 2004).

The reliability of the belief-based measure of perceived behavioural control is affected by the difficulty in measuring control beliefs related to all measurable control factors. If the global measure and belief-based measure are highly correlated, the information on control beliefs can be used to better understand why and how perceptions of behavioural control affect behaviour.

5.5.4.3 Belief-based measures versus global measures

One of the advantages of the TPB model is its identification of the role of underlying subfactors in the formation of attitudes, subjective norms and perceived behavioural control, i.e.,

1. outcome evaluations and outcome beliefs in the case of attitudes,
2. normative beliefs and motivations to comply in the case of subjective norms, and
3. control beliefs and control power in the case of perceived behavioural control.

Examining these underlying subfactors allows the analysis of specific issues and concerns that are most important in determining attitudes, subjective norms, perceptions of control and, ultimately behaviour.

Traditionally, global measures are used to estimate and fit the TPB model to the data. This provides a test of the applicability of the TPB model to the population under study. The two measurements (i.e., the belief-based measures and the global measures) are then correlated to determine how closely related they are. If this correlation is perfect (i.e., equal to one), then both measures are judged to be interchangeable and reliable, i.e., if the two measures meet this comparison criterion of high correlation, it implies that the underlying subfactors measured are reliable indicators of the respective global measure. This being the case, underlying subfactors can then be analysed and examined to get a better understanding of how the globally measured attitudes, subjective norms and perceived behavioural control are formed.

5.5.4.4 Behaviour

To optimise the predictive power of the model, the constructs of intentions, attitudes, subjective norms and perceived behavioural control should be assessed in close temporal proximity to the measure of behaviour and vice versa (Ajzen and Fishbein, 1980; Ajzen, 1985). There is a temporal association between the cognitive components of the model and behaviour, so any time lag between them will result in measures that are not compatible with each other and this will therefore decrease the ability of the cognitive measures to predict behaviour.

Two measures of behaviour were used to assess the dependent variable in the behaviour prediction model.

The first item used to assess the dependent variable was self-reported dental visiting behaviour: 'What is your usual reason for visiting the dentist?' Response format: 'For a regular check-up', 'for an occasional check-up', 'when in pain or discomfort', or 'when something needs to be fixed'. Responses to this item were recoded to create a dichotomous variable with the categories 'Problem/pain' or 'Other reason'.

The second item used to assess the dependent variable was actual dental visiting behaviour. This variable was obtained by determining the nature of the first CoC received after returning the questionnaire. This was done by accessing patient records for the baseline sample via the EXACT MIS. Actual dental attendance behaviour was categorised as either an emergency attender or general attender.

Past dental visiting behaviour within the public dental system, as ascertained in Section 4, was examined as a potential predictor of future behaviour, as numerous studies have shown that there is a direct relationship between measures of past and future behaviour, even after controlling for intentions and perceptions of behavioural control (Sheeran, 2002; Rhodes and Courneya, 2003). Past behaviour is thought to have a moderating effect on one's perceptions of the control they have over the behaviour, since having performed the behaviour in the past may alter their perceptions of being able to perform it in the future (Ajzen, 1988). Once they believe that they are able to perform a particular behaviour, there is an increased possibility of performing the behaviour in the future. This notion supports Bandura's (1977) self-efficacy theory. Another reason for including past behaviour in the prediction of future behaviour is that factors responsible for past behaviour carry into the future and can be responsible for the behaviour's future performance. For example, a perceived need to visit the dentist can influence dental visiting regardless of perception of control or self-efficacy concerns. Table 5.5 summarises the past dental attendance behaviour of the baseline sample among those who returned the questionnaire. The effect of past behaviour in the prediction of future behaviour will be examined within the prediction models by entering it into the models as an independent variable. The category 'Other' will not be included in subsequent analyses as this category includes those persons for which some or all of the CoC they received during the follow-up period were not able to be determined, and therefore does not provide any information about their past dental attendance behaviour (except of course to say that they did return during the follow-up period).

Table 5.5: Past dental visiting behaviour among the baseline sample for those who returned the questionnaire

Past dental attendance behaviour†	% n=502
Did not return	31.5
Emergency	36.3
General	9.0
Unknown	0.8
Emergency & General	21.5
Emergency & Unknown	0.6
General & Unknown	0.4

→

Past dental attendance behaviour†	% n=502
Did not return	31.5
Emergency	36.3
General	9.0
Emergency & General	21.5
Other	1.8

→

Past dental attendance behaviour†	% n=493
Did not return	32.0
Emergency	36.9
General	9.1
Emergency & General	21.9

† this variable is derived from the information collected on the dental attendance patterns of the baseline sample during the longitudinal follow-up of the baseline sample (see Section 4), and only relates to those baseline participants who returned the questionnaire measuring dental beliefs, values and attitudes.

5.5.5 Data collection methodology

The data collection methodology was based on the 'Total Design Method' developed by Dillman (1978). This method has been successful in securing high response rates from general and special samples. The method consisted of

1. Sending a personalised, advance-notice letter, otherwise known as a primary approach letter (PAL) to the study sample. The purpose of this letter was to tell people that they had been selected for the survey and that they would be receiving a questionnaire shortly. This letter was sent to help identify the purpose of the survey and to establish its legitimacy.

2. Approximately one week after the PAL was mailed, all baseline participants were mailed the questionnaire, together with a cover letter, instructions, an information sheet and a reply-paid envelope in which to return the completed questionnaire.

3. Approximately one week following the questionnaire mailing, a reminder card was sent to all baseline participants. The reminder card included an expression of thanks to those who had already returned their questionnaire and also served as a friendly reminder and requested a response from those who had not yet responded.

4. Two weeks after the reminder card was mailed, a new cover letter, questionnaire, and reply-paid envelope was sent to those who had not yet responded. This letter

conveyed the message that the researchers had not heard from them as yet and that their comments were important to the success of the survey. A second follow-up mailing was conducted for non-respondents.

The PAL, reminder card, cover letters, information sheet and questionnaire can be viewed in Appendices C and D.

5.5.5.1 Timeline of data collection phases

Figure 5.5 illustrates the timeline of the various data collection phases for this research and the variables measured at each point. Recall that recruitment of the baseline sample occurred in the period from June 1999 to October 2000. After patients in the baseline sample received their baseline dental care (i.e., either an emergency or general CoC) these patients were followed from the time they were recruited up until 31st December 2002 to determine their pattern of dental attendance post-baseline (determined from the nature of the CoC received during the follow-up period). For this research, this behaviour represented their past dental visiting behaviour. A questionnaire was then mailed to the baseline sample in June 2003 to ascertain information about their dental beliefs, values and attitudes. More specifically, dental visiting intention, dental attitude, subjective norm, perceptions of behavioural control, self-reported usual reason for visiting the dentist and perceived current need for a dental visit was collected at this stage. For those that returned the questionnaire, actual dental attendance post-questionnaire (represented by the nature of the first CoC received after returning the questionnaire) was then collected via the EXACT MIS. Follow-up of patients after the questionnaire mailout occurred from the time they returned the questionnaire (which was any time from June 2003 when the mailout was conducted to when the last reply was received which was in December 2003) up until 31st August 2004.

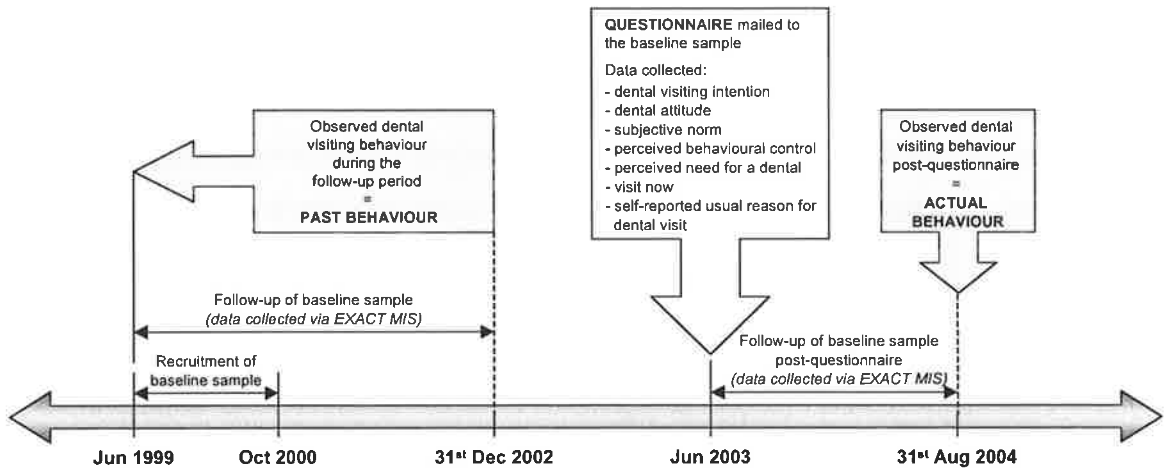


Figure 5.5: **Timeline depicting the various data collection phases for this research**

5.6 Statistical approach

This section looks at the statistical approach adopted for this chapter of the thesis by reviewing the dependent and independent variables to be used in the analyses, the data reduction techniques used to process the independent variables prior to statistical modelling, and lastly an outline of the approach to the statistical models.

5.6.1 Dependent and independent variables

The range of data items collected was outlined in Section 5.5 (Data collection tools). The main independent variables used in the analyses were global and belief-based measures of attitudes towards dental visiting, subjective norms and perceptions of behavioural control (deconstructed into measures of self-efficacy and perceived control). Age, sex, perceived need for dental treatment and past dental visiting behaviour were also examined as independent variables. The dependent variables used in the analyses were measures of dental visiting intentions and dental visiting behaviour.

5.6.2 Data reduction

Batteries of items were used to collect data on attitudes, subjective norms and perceived behavioural control. The items within each battery were subjected to a process of scale development to investigate the interrelationships of these items and to produce a set of independent variables that were both conceptually logical/coherent and parsimonious in accordance with the constructs of the TPB model. Scale development is presented in Section 5.7.5. Briefly, this involves assessing the reliability of each of the scales and conducting a factor analysis to identify sets of items within each battery that are related and can be used to form scales. The scales derived from this process will be used as independent variables in future analyses examining factors influencing dental visiting behaviour.

5.6.3 Statistical models

In the development and construction of the statistical models, the univariate distributions of both the dependent and independent variables were initially examined. The analyses then proceeded with the statistical testing of bivariate associations of the dependent variables by the independent variables. As analyses conducted related to explanatory/predictive models of dental visiting behaviour and there was no attempt to estimate population parameters, unweighted data were used.

In the statistical modelling process, the median value of continuous TPB variables was used as the cut-off point for the coding of dichotomous indicator variables to test whether or not this made a difference to the relationships observed in the statistical models. The use of median splits compensates for skewed distributions that can bring about small cell sizes. In addition, the use of a median split was considered more appropriate than simply using an arbitrary split as it provided an objective, empirical approach to the coding of indicator variables.

5.6.3.1 Testing the model

The relationship between global and belief-based measures is depicted diagrammatically in Figure 5.6. This figure shows the integration of the three sets of beliefs (behavioural beliefs, normative beliefs and control beliefs) and how they relate to the TPB. The TPB model proposes that:

1. attitudes, subjective norms and perceived behavioural control are correlates,
2. attitudes, subjective norms and perceived behavioural control have a direct effect on intentions and an indirect effect on behaviour through intentions
3. perceived behavioural control has a direct effect on behaviour

The relationships in (2) and (3) above can be expressed as two linear regression equations. That is, the TPB depicts

1. ***intentions*** as a linear regression function of attitudes, subjective norms and perceived behavioural control, i.e.,

$$INT = b_1\, ATT + b_2\, SN + b_3\, PBC + e_1$$

where INT is intentions, ATT is attitudes towards the behaviour, SN is subjective norms, PBC is perceived behavioural control, and b_1 to b_3 are standardised regression coefficients indicating the relative importance of the determinants of intentions (i.e., if the ith independent variable (where i=1, 2, 3) is changed 1 unit while all of the other independent variables are held constant, intention to visit the dentist is expected to change b_i units). The error term e_1 refers to the amount of variance in intentions that is not accounted for by ATT, SN and PBC.

This equation indicates that intentions are a function of one's attitudes towards performing the behaviour, one's perceptions that important others think they should or should not perform the behaviour, and perceptions of one's control over performance of the behaviour (Conner and Sparks, 1996).

2. ***behaviour*** as a linear regression function of intentions and perceived behavioural control, i.e.,

$$B = b_4\, PBC + b_5\, INT + e_2$$

where B is behaviour, PBC is perceived behavioural control, INT is intentions, and b4 to b5 are standardised regression coefficients indicating the relative importance of the determinants of behaviour. The error term e_2 denotes the amount of variance in behaviour that is unexplained by PBC and INT.

The relationship between intentions and behaviour indicates that people are likely to carry out behaviours they intend to perform. Generally these behaviours would be considered by the individual to be of some benefit to them, and one with some desirable outcome. The link between PBC and behaviour not only suggests that people are more likely to perform favourable behaviours they have control over, but also that people are prevented from carrying out behaviours over which they have no control (Conner and Sparks, 1996).

Figure 5.7 illustrates these relationships. Multiple linear regression and binary logistic regression were used to model intentions and behaviour respectively. The standardised regression coefficients resulting from the multiple regression analyses are somewhat similar to zero-order correlations, but unlike these raw correlations, they reflect the unique predictive power of each variable after the other variables have been controlled for. As a result, standardised regression coefficients tend to be lower in magnitude than raw correlations. Interpretation of the standardised regression coefficients is reasonably straightforward: the further away they are from zero, the stronger the association between the independent variable and the dependent variable. Standardised regression coefficients greater than zero indicate that the higher the score on the independent variable, the higher the score on the dependent variable, whereas the opposite is true if coefficients are less than zero (i.e., the higher the score on the independent variable, the lower the score on the dependent variable). The corresponding P-value for each standardised regression coefficient indicates whether the variable has statistically significant predictive capability in the presence of the other predictors.

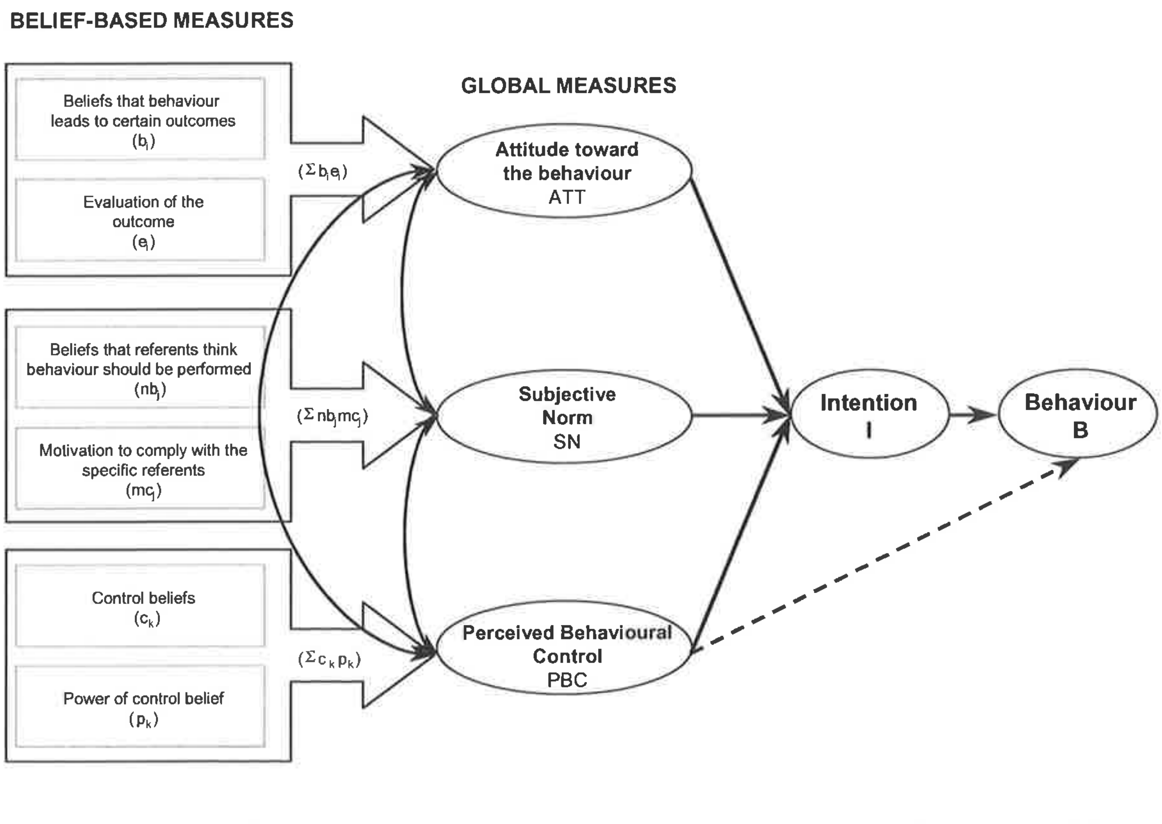


Figure 5.6: **Relationship between global and belief-based measures in the TPB model**

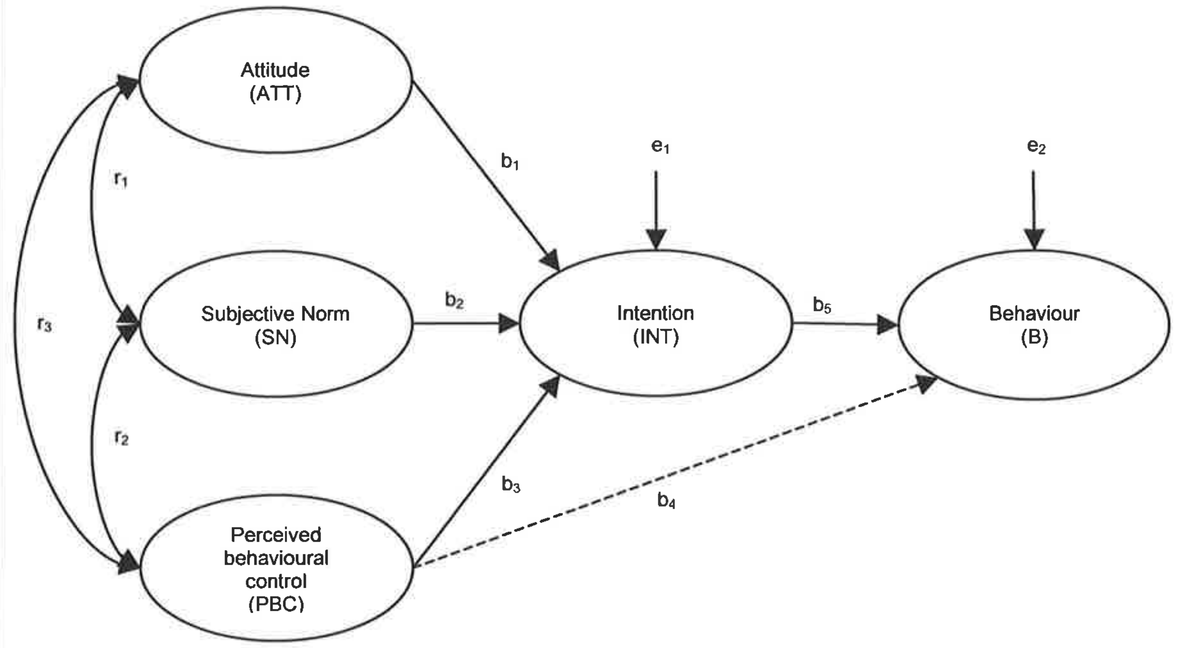


Figure 5.7: **Relationships in the TPB model**

5.7 Results

This section presents the results from the questionnaire data collection phase. Details of the response to the data collection, characteristics of responding participants and scale development of the global measures and reliability analyses of these scales are initially presented.

For the global cognitive measures (i.e., intention, attitude, subjective norm and perceived behavioural control) the following are presented:

1. overall mean scores and correlations of each construct;
2. the distribution and an item analysis of the global measures;
3. the distribution of intentions using a median split;
4. inferential statistics on the association of intention with each of the global cognitive measures

For the belief-based cognitive measures (i.e., attitudes, subjective norms and perceived behavioural control) the following are presented:

1. correlations with each of their respective global measures;

2. the distribution of each of the belief-based cognitive measures;
3. the distribution of the components of the belief-based measures (i.e., for each behavioural belief - distribution of the belief strength, outcome evaluation and the product score; for each normative belief - distribution of the normative belief strength, motivation to comply and product score; for each control belief - distribution of the control belief strength, control power and the product score)
4. correlations of each of the behavioural beliefs with global measures of intentions and attitudes;
5. correlations of each of the normative beliefs with global measures of intentions, subjective norms and attitudes;
6. correlations of each of the control beliefs with global measures of intentions, perceived behavioural control and attitudes;
7. inferential statistics on the association of intentions with each of the belief-based cognitive measures

The distributions of the behaviour measures employed in this research (i.e., self-reported usual reason for visiting the dentist and actual dental attendance behaviour post-questionnaire (see Figure 5.5)) are subsequently presented along with their association with the global and belief-based measures.

Regression models for predicting dental visiting intention and behaviour are then examined. Figure 5.8 and Figure 5.9 illustrate the regression models examined in order to predict dental visiting intentions and dental visiting behaviour respectively. Three separate regression models were examined in the prediction of dental visiting intention. The subtle differences between these intention models were in the measurement scales of the dependent and independent variables. For example, in Model 1 the dependent variable intention was entered as a continuous variable that used mean intention scores and in Models 2 and 3, the dependent variable intention was a categorisation of intender type using a median split. For Models 1 and 2, the independent TPB variables were mean scores whereas in Model 3, these independent variables were categorical variables derived using a median split. A similar approach was used to model self-reported usual reason for visiting the dentist and actual dental attendance behaviour.

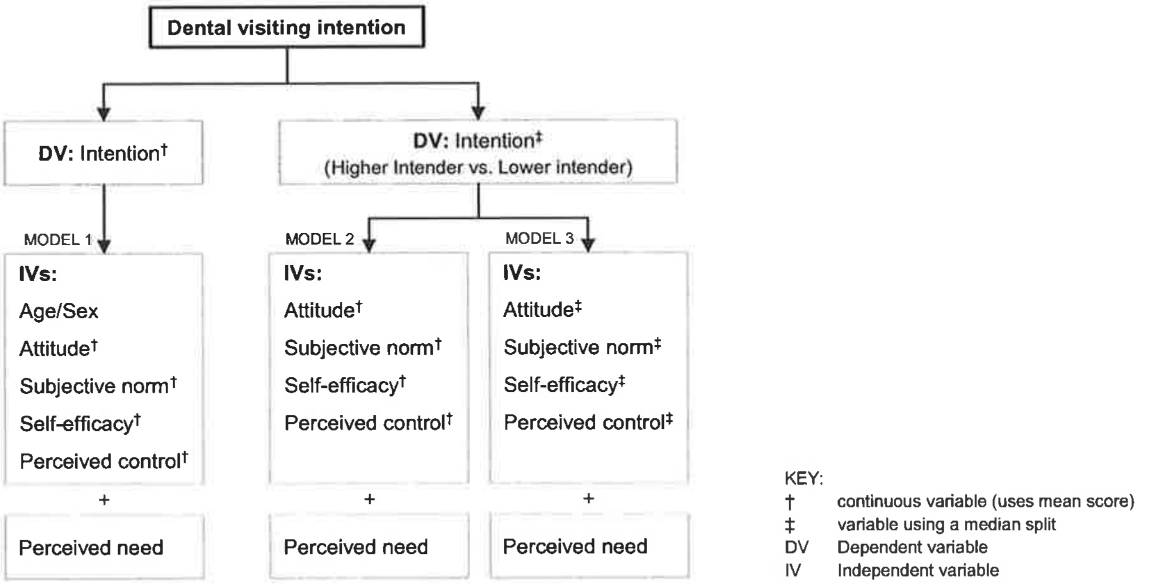


Figure 5.8: Linear regression model and logistic regression models examined in order to predict dental visiting intentions

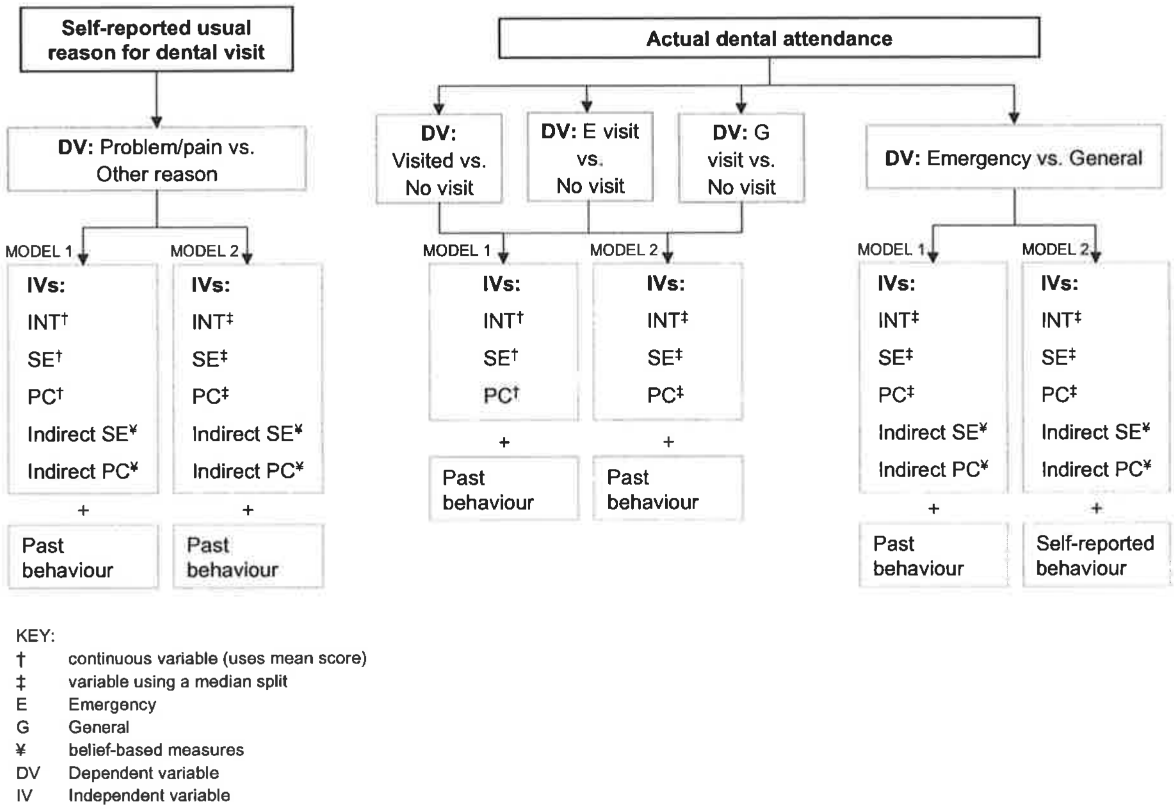


Figure 5.9: Logistic regression models examined to predict dental visiting behaviour

5.7.1 Response rate

A total of 517 persons responded to the survey, resulting in a response rate of 67.4%, as presented in Table 5.6. The invalid sample, which included those baseline participants who had moved state or country and were now out of scope, those who could not be contacted at their address recorded in the EXACT MIS database (i.e., 'return to sender' mail) and those who were deceased (as notified by a relative), were taken from the sample to leave the valid sample. The numbers received from the valid sample were used to calculate the response rate. Those who refused to participate in the survey were also included in the valid sample.

Table 5.6: Response to the questionnaire

Baseline sample	893
Out of scope	2
Uncontactable/return to sender	113
Deceased	11
Total invalid	126
Valid sample	767
Responded	517
Refusal	28
Percent response	**67.4**

Figure 5.10 shows the cumulative response to the survey by stage of mailing over the survey period. As discussed earlier, the data collection methodology was based on an approach recommended by Dillman (1978). The initial questionnaire was mailed out after the primary approach letter (PAL), with a response rate of 41.2% at the time of the reminder mailing. The first follow-up mailing with replacement questionnaire was sent to persons who had not yet responded at 6 weeks into the survey period. Prior to the first follow-up mailing a response rate of 56.7% was achieved. The reminder mail-out seemingly boosted the response rate by 15.5%. A second follow-up mailing was conducted at 13 weeks into the survey period, where again a replacement questionnaire was sent out to those who had failed to respond. At this stage a response rate of 64.5% had been reached, with the first follow-up mailing increasing the response rate by 7.8%. The final response rate of 67.4% was achieved in week 26 of the survey period. The second follow-up had less of an impact on the response rate, with only a further 2.9% of persons responding.

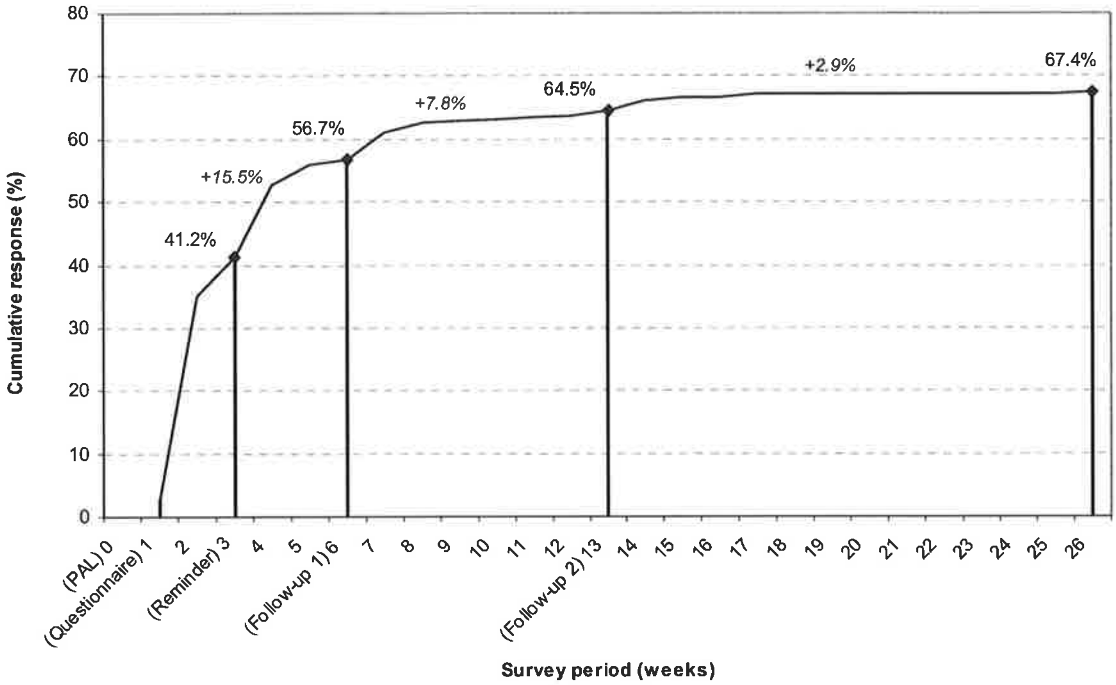


Figure 5.10: Response by stage of mailing

5.7.2 Data matching – baseline sample with questionnaire data

This section examines what proportion of those in the baseline sample had both data extracted from the EXACT MIS during the longitudinal follow-up (in order to establish a pattern of past dental visiting behaviour) and also returned the questionnaire examining dental beliefs, values and attitudes.

Table 5.7 presents the proportion of persons who returned the questionnaire and also had data extracted from the SADS EXACT MIS. A slightly greater proportion of the general baseline sample returned the questionnaire compared to the emergency baseline sample (52.2% cf. 47.8%). Of the 517 people who returned the questionnaire, 15 (or 2.9%) did not have any data extracted from the SADS database. Consequently, past dental visiting patterns could not be determined for these respondents. These respondents were subsequently removed from the analyses for the section examining predictors of dental visiting intention and behaviour whereby past behaviour was used as one of the predictor variables, leaving a total sample of 502 respondents.

Table 5.7: Proportion of persons who returned the questionnaire and have data extracted from the SADS EXACT MIS

		Data extracted		
Returned questionnaire		Yes	No	Total
Yes	N	502	15	517
	%	97.1	2.9	100.0

Of the 502 baseline participants who returned the questionnaire, 68.5% had treatment after baseline (see Table 5.8). Thus, the dental visiting behaviour of 31.5% of the sample that returned the questionnaire was unable to be determined.

Table 5.8: Proportion of persons responding to the questionnaire by those who had treatment after baseline

		Had treatment after baseline		
Returned questionnaire		Yes	No	Total
Yes	N	344	158	502
	%	68.5	31.5	100.0

Of those who returned the questionnaire and who had also returned for treatment after baseline, a greater proportion were from the emergency baseline sample (57.0% cf. 43.0%) (see Table 5.9).

Table 5.9: Proportion of persons who returned the questionnaire broken down by attendance after baseline and baseline sample status

		Baseline sample (row%)	
Visited post-baseline* **	*n*	Emergency	General
Yes	344	57.0	43.0
No	158	29.7	70.3
Total	502	48.4	51.6

*** (P<0.0001); χ^2 test

Examination of the proportion of persons in the emergency and general baseline sample who returned the questionnaire by attendance after baseline (see Table 5.10) revealed that a greater proportion of patients in the emergency sample returned for care post-baseline compared to general baseline patients (80.7% cf. 57.1%).

Table 5.10: Proportion of persons in the emergency and general baseline sample who returned the questionnaire by attendance after baseline

	Baseline sample (col%)		
Visited post-baseline***	Emergency (*n*=243)	General (*n*=259)	Total (*n*=502)
Yes	80.7	57.1	68.5
No	19.3	42.9	31.5

*** (P<0.0001); χ^2 test

5.7.3 Sample characteristics

The demographic characteristics of questionnaire respondents are presented in Table 5.11. Across the total sample there was a greater proportion of females sampled (60.0%), the mean age of participants was approximately 55 years, 57.6% of participants in the sample were born in Australia, just over 90% mainly spoke English at home, the majority of participants were of non-Indigenous background (90.2%) and only a small proportion had private dental insurance (10.4%).

Table 5.11: Characteristics of questionnaire respondents

Characteristic	**Total sample**
Sex (F)	60.0 (515)
Age**	54.9 ± 16.3
Australian born	57.6 (509)
English mainly spoken at home	90.2 (509)
Indigenous	0.8 (508)
Has private dental insurance*	10.4 (510)

Data are means ± SD or % (n).

5.7.4 Oral health and general health ratings

Respondents to the questionnaire were asked to rate both their general health and oral health as excellent, very good, good, average, poor or very poor. Table 5.12 presents the distribution of respondents according to their self-rated oral health and general health by baseline sample status. The majority of the sample rated their general health and oral health quite favourably. Some 69.1% of respondents reported that their general health was excellent, very good or good, while 53.6% considered their oral health to be excellent, very good or good. When the sample of questionnaire respondents was broken down according to their baseline sample classification, significant differences between self-rated oral health emerged between the emergency and general baseline samples. A significantly fewer proportion of emergency baseline patients rated their oral health positively compared to those respondents from the general baseline sample (45.7% cf. 60.9%).

Table 5.12: Self-rated oral health and general health among the sample of respondents by baseline sample status

	Emergency baseline sample	General baseline sample	Total sample
General health	(*n*=245)	(*n*=267)	(*n*=512)
- Excellent	8.6	7.9	8.2
- Very good	24.1	33.7	29.1
- Good	33.1	30.7	31.8
- Fair/average	26.5	24.3	25.4
- Poor	7.8	3.0	5.3
- Very poor	–	0.4	0.2
Oral Health**	(*n*=247)	(*n*=268)	(*n*=515)
- Excellent	3.6	3.4	3.5
- Very good	13.0	20.9	17.1
- Good	29.1	36.6	33.0
- Fair/average	36.8	31.7	34.2
- Poor	13.0	6.3	9.5
- Very poor	4.5	1.1	2.7

** (P<0.01); χ^2 test

5.7.5 Scale reliability of global measures

Attitudes, subjective norms, perceived behavioural control and intentions are not single measurable entities but are constructs which are derived from the measurement of other variables. In order to quantify constructs that are not directly measurable, multiple-item scales and summated ratings are often used to quantify the constructs of interest.

For this research, constructs (e.g., intentions, attitudes, subjective norms and perceived behavioural control) were measured using multi-item measures as opposed to using single-item measures. A measure constructed from multiple questionnaire items usually has several advantages over a score estimated from a response to a single item. These advantages include better representation of the concept (content validity) and gains in reliability from replication across items. Individual items have considerable random measurement error (i.e., are unreliable). However, measurement error averages out when individual scores are summed to obtain a total score (Nunnally and Bernstein, 1994). In addition, a single item cannot discriminate among fine degrees of an attribute and they also tend to lack scope. McIver and Carmines (1981) report the unlikelihood of a single item fully representing a complex theoretical concept or any specific attribute.

5.7.5.1 Scale formation methodology

In this study, four multiple-item scales were developed to measure the four main constructs comprising the TPB, namely intentions, attitudes, subjective norms and perceived behavioural control. The survey instrument was a self-report instrument designed to measure different aspects of dental visiting. The survey included 15 measurement items used to derive the various constructs of the model. Based on the TPB, conceptually related measurement items were grouped into four scales (i.e., attitudes, subjective norms, perceived behavioural control and intentions). Analyses were conducted to assess the reliability of the four scales. The four scales contained the questionnaire items detailed in Table 5.13. Each of the items within the scales used a 7-point Likert-type response format.

Intentions	
INT1	I want to visit the dentist (disagree-agree)
INT2	I plan to visit the dentist (disagree-agree)
Attitudes	
ATT1	My visiting the dentist would be...(harmful-beneficial)
ATT2	My visiting the dentist would be...(unpleasant-pleasant)
ATT3	My visiting the dentist would be...(worthless-worthwhile)
Subjective norms	
SN1	People who are important to me think I should visit the dentist (disagree-agree)
SN2	People who are important to me would approve of me visiting the dentist (disagree-agree)
SN3	People who are important to me want me to visit the dentist (disagree-agree)
Perceived behavioural control	
PBC1	For me to visit the dentist from now on would be...(difficult-easy)
PBC2	What is the likelihood of you visiting the dentist from now on? (unlikely-likely)
PBC3	It is mostly up to me whether I visit the dentist (disagree-agree)
PBC4	Whether or not I visit the dentist is entirely up to me (disagree-agree)
PBC5	I have complete control over whether or not I visit the dentist (disagree-agree)
PBC6	There are factors outside my control that could prevent me from visiting the dentist (disagree-agree)

Table 5.13: Items used to measure the components of the TPB

5.7.5.2 Reliability analysis

The reliability of the scales and their individual items was empirically examined through the calculation of Cronbach's alpha coefficients. Cronbach's alpha is used as a measure of the 'Internal Consistency Reliability' of the scale (i.e., that items in the scale measure the same construct). Alpha values are based on the average correlation among the items on a scale. Cronbach's alpha is therefore expressed as a correlation coefficient, ranging in value from 0 to +1. Generally an estimate of 0.70 or higher is required for judging a scale reliable.

Note also that deleting an item and examining the change that this omission causes in the scale's alpha level can reveal the 'fit' of a specific item to its conceptualised scale. If the item is well fitted to its scale, the alpha level change should be minimal. However, if deletion of an item causes a substantial rise in the scale's alpha reliability score, removal of the measurement item should be considered.

Note that measures of internal reliability (e.g., Cronbach's alpha) are not appropriate for the belief-based indicators in the TPB. Belief-based measures are formative rather than reflective indicators of the measured construct (Conner et al., 2001; Davis et al., 2002). In addition, as Francis et al. (2004) explain, 'because people can quite logically hold both positive and negative beliefs about the same behaviour, it is not appropriate to assess the reliability of indirect measures using an internal consistency criterion' (p9).

Corrected item-total correlation, which is the correlation of the item designated with the summated score for all other items, was also used to examine 'Item Internal Consistency Validity'. Item internal consistency validity refers to the goodness-of-fit of items within a scale. A rule-of-thumb is that these values should be at least 0.40 (Gliem and Gliem, 2003). Following are reliability analysis results from each individual scale.

Attitudes

The attitudes scale contained 3 measurement items that were designed to capture a person's attitudes towards visiting the dentist.

The scale demonstrated a poor level of item internal consistency validity. The 3 measurement items had item-scale correlations ranging from 0.16 to 0.42 (see Table 5.14). A correlation score of 0.40 is generally accepted as the minimum standard for acceptable internal consistency.

The internal consistency reliability of the attitudes scale was also shown to be unacceptable with an alpha coefficient of 0.46 (see Table 5.14), which is considerably lower than the 0.70 deemed minimally reliable.

Given these results, the fit of individual measurement items to their conceptualised scale was investigated by examining the change in alpha level after the omission of each of the measurement items. The omission of item ATT2 significantly raised the alpha score of the scale to a more acceptable level of 0.74, indicating a very satisfactory internal consistency reliability of this scale. The item-scale correlation among the remaining two measurement items was 0.60, now meeting the minimum standard of 0.40 for displaying item internal consistency validity. Since the deletion of item ATT2 caused a substantial rise in the scale's alpha coefficient, this measurement item should be removed from the scale. Conceptually this makes sense, as item ATT2 measured how adverse the experience of visiting the dentist would be, whereas the other two items (ATT1 and ATT3) measured a person's belief about the perceived outcome of visiting the dentist. For example, a person may believe that visiting the dentist will be an unpleasant experience but also hold the belief that visiting the dentist will be of great benefit to their oral health outcome. The results of the reliability analysis after the removal of item ATT2 are shown in Table 5.15.

Table 5.14: Results of the reliability analysis for the attitudes scale

Item	Corrected item-total correlation	Alpha if item deleted
ATT1	0.4240	0.1720
ATT2	0.1636	0.7483
ATT3	0.3730	0.2698

Alpha coefficient = 0.4557

Table 5.15: Results of the reliability analysis for the attitudes scale with item ATT2 removed

Item	Corrected item-total correlation	Alpha if item deleted
ATT1	0.5997	.
ATT3	0.5997	.

Alpha coefficient = 0.7483

Subjective norms

The subjective norms scale contained 3 measurement items that were designed to assess beliefs about social pressure to visit the dentist.

The scale demonstrated a high level of item internal consistency validity. All the 3 measurement items had item-scale correlations ranging from 0.75 to 0.83, well above the 0.40 standard.

The alpha coefficient for this scale was 0.89. The omission of any of the 3 items did not have any substantial effect on the alpha coefficient of the scale. These indicate a very satisfactory internal consistency reliability of this scale. The results of reliability analysis for this scale are shown in Table 5.16.

Table 5.16: Results of the reliability analysis for the subjective norms scale

Item	Corrected item-total correlation	Alpha if item deleted
SN1	0.8234	0.8230
SN2	0.7470	0.8937
SN3	0.8278	0.8172

Alpha coefficient = 0.8939

Perceived behavioural control

The perceived behavioural control scale contained 6 measurement items that were designed to assess perceptions of control with regards to visiting the dentist.

Three measurement items had item-scale correlations below the 0.40 standard (see Table 5.17). Two of these items were in fact items assessing self-efficacy beliefs which are recognised to be quite different from the other 4 items in the scale measuring perceptions of control over visiting the dentist. Reliability analysis for this scale was therefore redone with the self-efficacy items (i.e., PBC1 and PBC2) taken out and considered as a separate scale. These results are shown in Table 5.18.

When those items measuring self-efficacy and perceived control were considered as two separate scales, item internal consistency validity was markedly better, with measurement items in the self-efficacy scale and all bar one item (i.e., item PBC6) in the perceived control scale having item-scale correlations above the recommended 0.4 level. Item PBC6 was subsequently removed from the perceived control scale and reliability analyses were rerun for this scale. The omission of item PBC6 from this scale resulted in item-scale correlations ranging from 0.80 to 0.88. As indicated in Table 5.19, by removing item PBC6 the alpha coefficient of the scale also increased substantially. Thus, the alpha coefficients for the self-efficacy scale and perceived control scales were 0. 64 and 0.91 respectively, indicating a very satisfactory internal consistency reliability of these scales.

Table 5.17: Results of the reliability analysis for the perceived behavioural control scale

Item	Corrected item-total correlation	Alpha if item deleted
PBC1	0.3469	0.7781
PBC2	0.3828	0.7686
PBC3	0.6861	0.6691
PBC4	0.7066	0.6900
PBC5	0.7173	0.6834
PBC6	0.3613	0.7952

Alpha coefficient = 0.7725

Table 5.18: **Results of the reliability analysis for the self-efficacy and perceived control scale**

Self-efficacy			Perceived control		
Item	Corrected item-total correlation	Alpha if item deleted	Item	Corrected item-total correlation	Alpha if item deleted
PBC1	0.4796	.	PBC3	0.7141	0.7241
PBC2	0.4796	.	PBC4	0.7761	0.6893
			PBC5	0.7693	0.6860
			PBC6	0.3503	0.9142
Alpha coefficient =0.6436			Alpha coefficient = 0.8068		

Table 5.19: **Results of the reliability analysis for the perceived control scale with item PBC6 removed**

Perceived control		
Item	Corrected item-total correlation	Alpha if item deleted
PBC3	0.8044	0.8971
PBC4	0.8780	0.8341
PBC5	0.8080	0.8967
Alpha coefficient = 0.9143		

Intentions

The intentions scale contained two measurement items that were designed to assess a person's intention to visit the dentist. The scale demonstrated a high level of Item internal consistency validity, with measurement items having item-scale correlations of 0.73, well above the 0.40 standard.

The alpha coefficient of this scale was 0.84 indicating a very satisfactory internal consistency reliability of this scale. The results of reliability analysis for this scale are presented in Table 5.20.

Table 5.20: **Results of the reliability analysis for the intentions scale**

Item	Corrected Item-total correlation	Alpha if item deleted
INT1	0.7285	.
INT2	0.7285	.
Alpha coefficient = 0.8429		

5.7.5.3 Factor analysis

While high Cronbach alphas indicate good internal consistency of the items in the scale, this does not necessarily mean that the scale is unidimensional. Factor analysis is a method that can be used to determine the dimensionality of a scale.

Factor analysis was therefore conducted to confirm that items used to obtain global measures of attitudes, subjective norms and perceived behavioural control loaded highly on each of the attitudes, subjective norms and perceived behavioural control factors respectively. Factor analysis was also used to confirm that items measuring each factor had relatively low loadings on the other factors in the model.

Consequently, all items used to derive the independent variables were tested with a principal components factor analysis with varimax rotation. Generally, factors with eigenvalues greater than 1.0 are retained, but selecting the number of factors also involves consideration of the reasonableness of the solution and knowledge of the subject matter (Johnson and Wichern 1988; Kim and Mueller 1978). It was decided a priori that items with a factor loading of 0.70 or greater on a principal component and less than 0.30 on any other factor would be considered part of an orthogonal construct. The analysis yielded a four-factor solution. All items on the attitude and subjective norm scales loaded as two respective factors. Items on the perceived behavioural control scale loaded as a two separate factors. Conceptually this was valid since this scale contained two items measuring self-efficacy and 4 items measuring controllability.

Table 5.21 presents the results of a factor analysis of the attitude, subjective norm and perceived behavioural control items in the TPB. The analysis revealed that there were three factors with eigenvalues greater than 1.0, with a fourth factor having an eigenvalue of just below 1.0. As the fourth factor accounted for a considerable percentage of the variance (8.7%), a four-factor solution was obtained. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to predict if the data would factor well. Overall, the sampling adequacy was acceptable, with KMO=0.74 (which is above the recommended level of 0.60 (Kim and Mueller, 1978)). Communality values were all above 0.30 (with the exception of PBC6), indicating that factors accounted for a large percentage of the sample variance in each item.

Items which loaded on a factor are indicated in the table by a box around the factor loading. The factor structure obtained fitted the theoretical structure (i.e., TPB model) well, with factor 1, factor 2 and factor 3 consisting of items measuring perceived behavioural control, subjective norms and attitudes respectively. Factor 4 represented self-efficacy, supporting the notion of self-efficacy and perceived control being two quite separate attributes. Table 5.22 presents the results of the factor analysis with item PBC6 removed.

Table 5.21: Factor analysis of items measuring constructs in the TPB

Initial statistics [a]				Final statistics [b]					
		Variance			Factor loadings				
Factor	Eigenvalue	%	Cum. %	Item label	1	2	3	4	h^2
1	3.268	29.707	29.707	PBC4	0.939	0.037	-0.004	0.077	0.889
2	2.695	24.500	54.207	PBC5	0.898	0.027	-0.035	0.150	0.832
3	1.438	13.069	67.277	PBC3	0.894	0.018	0.057	0.121	0.817
4	0.962	8.746	76.023	*PBC6	0.401	-0.037	-0.091	0.348	0.292
5	0.832	7.562	83.585	SN3	-0.004	0.912	0.125	0.084	0.854
6	0.494	4.488	88.074	SN1	0.005	0.909	0.172	-0.021	0.856
7	0.388	3.524	91.598	SN2	0.049	0.873	0.096	0.081	0.779
8	0.337	3.068	94.666	ATT3	-0.001	0.203	0.874	0.018	0.806
9	0.256	2.328	96.994	ATT1	-0.038	0.133	0.854	0.217	0.795
10	0.186	1.693	98.688	PBC1	0.112	0.062	0.067	0.872	0.781
11	0.144	1.312	100.00	PBC2	0.195	0.087	0.232	0.750	0.662
				Variance (%):	24.570	22.665	14.720	14.069	
				Cronbach α:	0.8068	0.8939	0.7483	0.6436	

(a) factor analysis method = principal components

(b) rotation = varimax

h^2 = communalities (i.e., the proportion of an item's variance explained by a factor structure)

Kaiser-Meyer-Olkin measure of sampling adequacy = 0.743

* direction reversed

Note:

Although the three factors attitudes, subjective norms and perceived behavioural control are hypothesised to be correlated, orthogonal rotation (which assumes factors are not correlated with one another and therefore the axes in the solution are kept at 90 degrees to each other, e.g., 'varimax') was used over oblique rotation (which assumes factors are correlated, e.g., 'oblimin') as oblique solutions are a little harder to interpret because one must take into account the correlations between factors when looking at factor loadings. For this particular dataset, the two types of rotations led to similar results so it was much easier to report the results of the orthogonal rotation.

Table 5.22: **Factor analysis of items measuring constructs in the TPB with item PBC6 excluded**

Initial statistics [a]				Final statistics [b]					
		Variance			Factor loadings				
Factor	Eigenvalue	%	Cum. %	Item label	1	2	3	4	h^2
1	3.193	31.931	31.931	PBC4	0.945	0.032	-0.020	0.091	0.902
2	2.585	25.853	57.784	PBC3	0.902	0.012	0.036	0.144	0.836
3	1.436	14.360	72.144	PBC5	0.898	0.023	-0.043	0.146	0.830
4	0.957	9.574	81.718	SN3	0.001	0.912	0.126	0.090	0.855
5	0.506	5.055	86.773	SN1	0.013	0.909	0.171	-0.006	0.856
6	0.390	3.903	90.676	SN2	0.053	0.872	0.097	0.085	0.780
7	0.338	3.382	94.058	ATT3	0.001	0.201	0.883	0.020	0.821
8	0.264	2.636	96.694	ATT1	-0.031	0.131	0.851	0.232	0.796
9	0.186	1.864	98.558	PBC1	0.118	0.056	0.047	0.875	0.785
10	0.144	1.442	100.00	PBC2	0.207	0.079	0.195	0.790	0.712
				Variance (%):	25.727	24.862	16.023	15.106	
				Cronbach α:	0.9143	0.8939	0.7483	0.6436	

(a) factor analysis method = principal components
(b) rotation = varimax
h^2 = communalities (i.e., the proportion of an item's variance explained by a factor structure)
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.734

5.7.6 Global measures

5.7.6.1 Overall means and correlations

Direct measures of intentions, attitudes, subjective norms and perceived behavioural control were obtained by averaging the responses to items measuring each respective factor. Table 5.23 presents the descriptive statistics and correlations among the major variables of interest. All the variables were scored consistently so that higher mean scores reflected more positive attitudes towards dental visiting, more positive subjective norms to visit the dentist, and higher perceived behavioural control to visit the dentist. As can be seen in Table 5.23, means for each of the cognitive measures were quite high, indicating strong intentions and favourable attitudes, subjective norms and perceptions of behavioural control toward visiting the dentist.

The mean score across the two questions that made up the intention scale was 5.53 with a standard deviation of 1.57. Here the minimum possible score was 1, the maximum 7, and the midpoint 4. This means that on average respondents showed a moderately strong intention to visit the dentist. But the spread of scores is quite large, which signals that some people had a very strong intention to visit the dentist whilst some others felt quite the opposite. The variation in intentions scores was helpful in the sense that it allowed scope for investigating what factors strengthen or undermine intentions. The mean score across the two questions that assessed attitudes was 6.29, with a standard deviation of 0.71. Again, this suggested moderately strong positive attitudes, on average, towards visiting the dentist. The spread of scores is again quite large, but less so than for intentions. It may well be the case that a wider range of factors influences intentions than attitudes. Similar interpretations could be made for measures of subjective norms and perceptions of behavioural control. For instance, the mean score across the three questions that assessed subjective norms was 5.67 with a standard deviation of 1.35. This indicated that on the whole there was fairly strong social approval for visiting the dentist. The mean score across the two questions assessing self-efficacy was 5.24, with a standard deviation of 1.34. The mean score across items measuring perceived control were 6.01 with a standard deviation of 1.62. So, on average, respondents felt quite a moderate sense of personal control over visiting the dentist – they were quite confident they could do so, and anticipated few difficulties. However, the spread of scores here was quite large, so there were quite a number of respondents who felt less than confident and/or saw considerable difficulties. These questions, more than most, are likely to be susceptible to differences between subgroups of respondents, particularly between those who usually attend for emergency dental care only and those who attend for general dental care. These differences will be examined shortly.

Intentions had a statistically significant positive correlation with attitudes towards dental visiting, subjective norms and self-efficacy, but was not correlated with perceived control. The other components of the model were also significantly correlated with each other. Consider for example the correlation between attitudes and intentions. The correlation between attitudes and intentions for the whole sample was 0.32. This was moderately large and highly statistically significant. Intuitively, this means that the more positive a person's attitudes, the more likely they are to intend to visit the dentist. However, this correlation leaves considerable room for other influences on intentions. Attitudes certainly are not the only important predictor of intentions. This is in itself an important finding. Positive attitudes towards visiting the dentist do not necessarily translate into intentions to do so. As suggested by the TPB, and by the results obtained from the correlation analyses (see Table 5.23), subjective norms and perception of behavioural control are also important predictors of intentions to visit the dentist.

Table 5.23: **Intentions, attitudes, subjective norms, perceived behavioural control: means, standard deviations, and correlations# (N=517)**

Variable	n	Mean‡	SD	Correlation coefficients# I	ATT	SN	PBC	SE	PC
Intentions (I)	501	5.526	1.568	–					
Attitudes (ATT)[a]	509	6.290	0.713	0.321**	–				
Subjective norms (SN)	511	5.665	1.348	0.284**	0.381**	–			
Perceived behavioural control (PBC)[b]	510	5.699	1.248	0.209**	0.228**	0.210**	–		
- Self-efficacy (SE)†	510	5.235	1.341	0.287**	0.285**	0.241**	0.779**	–	
- Perceived control (PC)†b	508	6.011	1.615	0.068	0.107*	0.094*	0.787**	0.312**	–

Spearman's rho correlation coefficient
** Correlation is significant at the 0.01 level (2-tailed) (i.e., P<0.01)
* Correlation is significant at the 0.05 level (2-tailed) (i.e., P<0.05)
a Attitudes measure excluded item ATT2
b Perceived behavioural control measure excluded item PBC6
† Self-efficacy and perceived control are 2 distinct components derived from the perceived behavioural control factor
‡ Minimum score=1, Maximum=7

Distribution of global measure scores

Overall mean scores for global measures of intentions, attitudes, subjective norms and perceived behavioural control (including self-efficacy and perceived control) were collapsed into 3 categories to determine the proportion of persons responding below the midpoint of the scale (an unfavourable response), at the midpoint of the scale (impartial) and above the midpoint of the scale (a favourable response). These results are presented graphically in Figure 5.11. The distributions of each of the cognitive measures were skewed to the left (i.e. negatively skewed distributions), indicating that most people responded favourably in relation to their attitudes, subjective norms and perceived behavioural control towards visiting the dentist. However, there were still a number of persons who responded at or below the midpoint of each of the scales, indicating variability between responders within these measures.

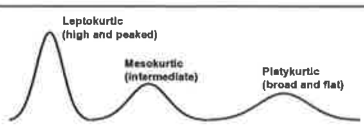
Skewness and kurtosis statistics for each of the TPB variables are presented in Table 5.24. The skewness statistic of a normal distribution is approximately zero. As the skewness statistic departs further from zero, a positive value indicates a positively skewed distribution (i.e., a distribution with scores grouped toward the low end of the score scale) or a negative value indicates a negatively skewed distribution (i.e., a distribution with scores grouped toward the high end of the scale). The skewness statistics for each of the TPB variables were negative, confirming their negatively skewed distributions. If the absolute value of the skewness statistic is greater than 2 standard errors of skewness, then the distribution is assumed to be significantly skewed. (Tabachnick and Fidell, 1996). For each of the TPB variables, the value of two times the standard error of the skewness was greater than the absolute value of the skewness statistic, so it was assumed that the distribution for each measure was significantly skewed.

Kurtosis, which characterises the relative 'peakedness' or flatness of a distribution compared to the normal distribution, was also examined. Positive kurtosis indicates a relatively peaked distribution whereas negative kurtosis indicates a relatively flat distribution. Normal distributions produce a kurtosis statistic of about zero, indicating a mesokurtic distribution. As the kurtosis statistic departs further from zero, a positive value indicates a leptokurtic distribution (i.e., a high and peaked distribution) or a negative value indicates a platykurtic distribution (i.e., a broad and flat distribution). The kurtosis statistics for each of the TPB variables were positive, indicating that there was a possibility that each of the TPB measures had a leptokurtic distribution. If the absolute value of the kurtosis statistic is greater than 2 standard errors of kurtosis, then the distribution is assumed to be significantly different from a mesokurtic distribution. (Tabachnick and Fidell, 1996). The absolute value of the kurtosis statistic was greater than 2 standard errors of kurtosis for the direct measures of intention, attitude and perceived behavioural control and its components, but not for subjective norm. Therefore, with the exception of the subjective norms construct, it can be assumed that the distributions of the direct measures of intentions, attitudes and perceived behavioural control and its components differ significantly from a normal distribution.

Table 5.24: Skewness and kurtosis statistics of the cognitive measures in TPB

	TPB variable					
Statistic	**I**	**ATT**	**SN**	**PBC**	**SE**	**PC**
Skewness	-1.155	-1.300	-0.860	-1.515	-0.971	-1.407
Std Error of skewness	0.109	0.108	0.108	0.108	0.108	0.108
2 x Std Error of skewness	0.218	0.217	0.216	0.216	0.216	0.217
Kurtosis†	0.890	2.861	0.284	2.004	0.632	1.585
Std Error of Kurtosis	0.218	0.216	0.216	0.216	0.216	0.216
2 x Std Error of kurtosis	0.436	0.432	0.431	0.432	0.432	0.433

† Kurtosis can be depicted diagrammatically as:



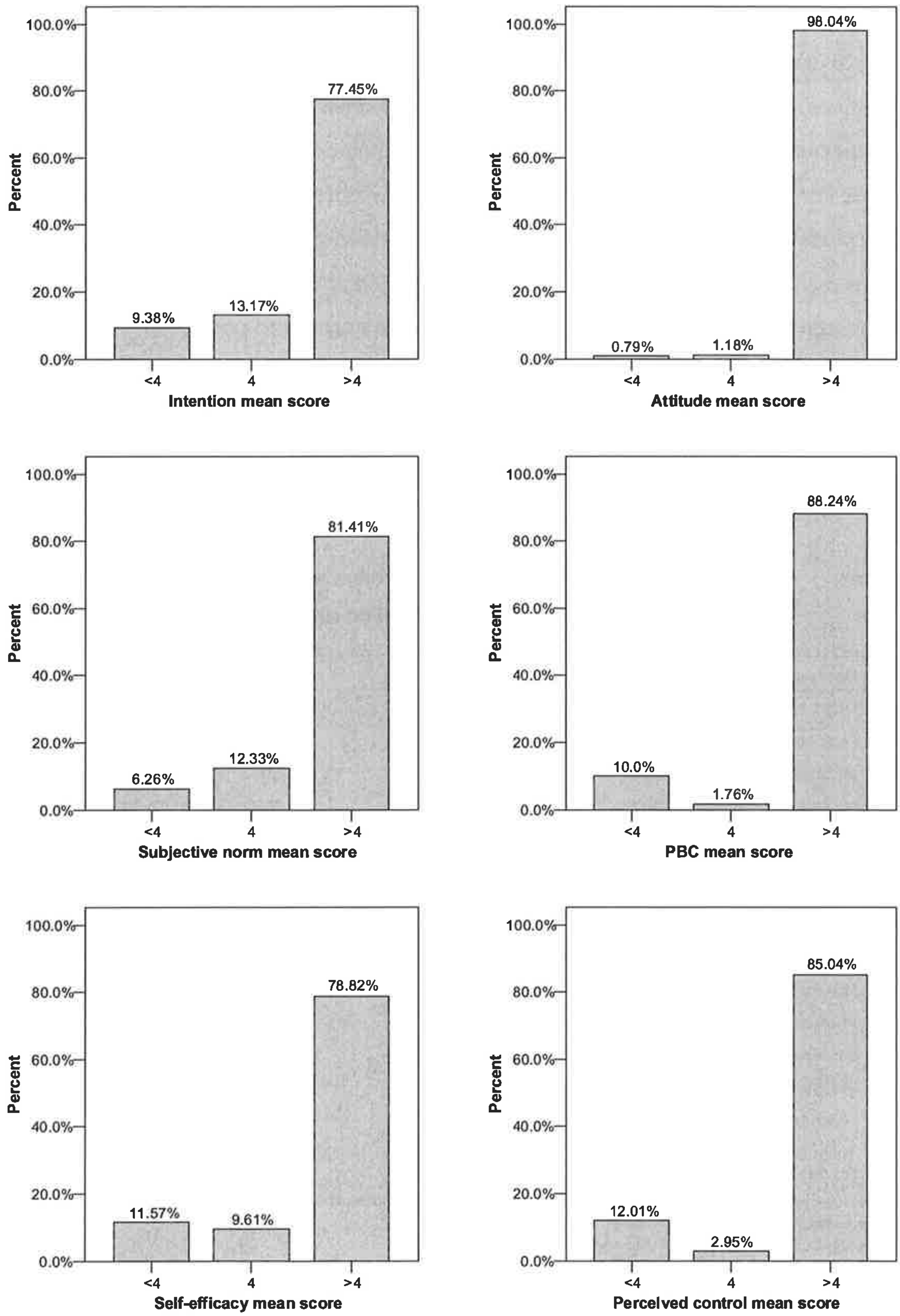


Figure 5.11: Distribution of the cognitive measures in TPB

Item analysis of global measures

Table 5.25 presents the distribution of individual items used to construct global measures of intentions, attitudes, subjective norms and perceived behavioural control. In Table 5.25, higher means once again indicate a more favourable response for the variables in question. For example, higher means indicate more favourable attitudes, subjective norms and/or perceived behavioural control in relation to visiting the dentist. High mean values for items measuring dental visiting intentions indicated strong intent to visit the dentist. Respondents also had favourable attitudes, subjective norms and perceptions of control as indicated by reasonably high mean scores for each of the respective items (with the exception of attitudes item 2 (ATT2) and perceived behavioural control item 6 (PBC6), which were removed from subsequent analyses based on the reliability analyses and factor analyses conducted).

Table 5.25: Distribution of items used to construct global measures of intentions, attitudes, subjective norms and perceived behavioural control

Item	Description	*N*	Mean	SD	Min	Max
INT1	I want to visit the dentist[a]	498	5.606	1.674	1	7
INT2	I plan to visit the dentist[a]	495	5.455	1.678	1	7
ATT1	My visiting the dentist would be...[b]	508	6.301	0.810	1	7
ATT2	My visiting the dentist would be...[c†]	503	4.219	1.387	1	7
ATT3	My visiting the dentist would be...[d]	502	6.283	0.766	2	7
SN1	People who are important to me think I should visit the dentist[a]	510	5.392	1.593	1	7
SN2	People who are important to me would approve of me visiting the dentist[a]	511	6.008	1.280	1	7
SN3	People who are important to me want me to visit the dentist[a]	509	5.589	1.562	1	7
PBC1	For me to visit the dentist from now on would be...[e]	507	4.821	1.666	1	7
PBC2	What is the likelihood of you visiting the dentist from now on?[f]	507	5.655	1.437	1	7
PBC3	It is mostly up to me whether I visit the dentist[a]	506	6.140	1.622	1	7
PBC4	Whether or not I visit the dentist is entirely up to me[a]	506	6.032	1.729	1	7
PBC5	I have complete control over whether or not I visit the dentist[a]	508	5.878	1.853	1	7
PBC6	There are factors outside my control that could prevent me from visiting the dentist[a†]	504	4.202	2.276	1	7

† Item subsequently removed from scale based on results from reliability analyses in section 5.7.5
a Response format: 7-point disagree-agree scale
b Response format: 7-point harmful-beneficial scale
c Response format: 7-point unpleasant-pleasant scale
d Response format: 7-point worthless-worthwhile scale
e Response format: 7-point difficult-easy scale
f Response format: 7-point unlikely-likely scale

5.7.6.2 Intentions

The distribution of mean scores for the direct measure of intentions was examined to determine the proportion of persons intending to visit the dentist ('intenders') and the proportion who did not intend to visit the dentist ('non-intenders'). These results are presented in Table 5.26. Intenders were considered to be those with mean scores greater than the midpoint of 4 and non-intenders were those with mean scores less than the midpoint of 4. As can be seen from Table 5.26, 9.4% of participants did not intend to visit while 77.4% indicated that they did intend to visit the dentist. Some 13.2% of the sample were impartial to visiting the dentist.

Table 5.26: Distribution of the direct measure of intention

Direct intention mean score†	*N*	Percent	Cumulative percent
1.00	20	4.0	4.0
1.50	1	.2	4.2
2.00	7	1.4	5.6
2.50	3	.6	6.2
3.00	9	1.8	8.0
3.50	7	1.4	9.4
4.00 (Midpoint)	66	**13.2**	22.6
4.50	26	5.2	27.7
5.00	44	8.8	36.5
5.50	37	7.4	43.9
6.00	75	15.0	58.9
6.50	45	9.0	67.9
7.00	161	32.1	100.0
Total	501	100.0	

† Intention scored from 1 to 7 (strongly disagree to strongly agree)

5.7.6.3 Intender type

The direct measure of intentions was dichotomised using a median split (i.e., lower intenders (LI) (below the median) versus higher intenders (HI) (above the median)) in order to determine which specific beliefs have the greatest influence on intention to visit the dentist. The median value for the direct measure of intention was 6.0. The proportion of persons falling into each intender category (i.e., lower intender: Median < 6 and higher intender: Median ≥6) is shown in Table 5.27.

Table 5.27: Proportion of persons by intender type category

Intender type	*n*	Per cent
Lower intender (LI): Median<6	220	43.9
Higher intender (HI): Median ≥6	281	56.1
Total	501	100.0

Global measures by intender type

Lower intenders and higher intenders were compared with respect to direct measures of attitudes, subjective norms and perceived behavioural control (broken down into measures of self-efficacy and perceived control). Lower intenders reported significantly lower mean attitudes, subjective norms and perceived behavioural control scores. Nevertheless, mean scores between the two groups were reasonably high, reflecting favourable responses to the constructs measured. The average self-efficacy score for lower intenders was significantly lower than it was for higher intenders, indicating that those with lower intentions to visit the dentist were less confident about visiting the dentist. These results are presented in Table 5.28.

Table 5.28: Global measures by intender type: means and standard deviations

	Intender type						
	LI			HI			
Cognitive measure	*n*	Mean	SD	*n*	Mean	SD	
Attitudes (ATT)	217	6.099	0.784	277	6.440	0.615	***
Subjective norms (SN)	218	5.278	1.339	278	5.936	1.296	***
Perceived behavioural control (PBC)	216	5.528	1.230	279	5.836	1.250	**
- Self-efficacy (SE)	216	4.900	1.365	279	5.505	1.261	***
- Perceived control (PC)	216	5.944	1.599	277	6.063	1.629	

*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

5.7.7 Belief-based measures

Specific underlying beliefs provide substantive information about the kinds of considerations that guide the behaviour of individuals in the study sample. Before these beliefs are examined, however, it is important to check whether they correlate with the corresponding global measures. A strong correlation confirms that the appropriate accessible beliefs were identified and properly measured.

Ajzen and Fishbein (1980) suggest the following guidelines for the interpretation of correlations:
'In the social sciences, correlations around .30 have been considered satisfactory and,

consistent with this practice, we would suggest that correlations below this level are usually of little practical value even if they are statistically significant. Correlations in the range of .30 to .50 may be considered of moderate magnitude, while correlations exceeding .50 indicate relatively strong relationships between two variables' (p99).

Each set of beliefs was significantly correlated with their direct measure: behavioural beliefs with attitudes, normative beliefs with subjective norms and control beliefs with perceived behavioural control (including internal control beliefs with the direct measure of self-efficacy and external control beliefs with the direct measure of perceived control). These results are presented in Table 5.29.

The direct measure of attitudes was correlated with the summed products of the 18 behavioural beliefs and outcome evaluations. This correlation was 0.35 ($P<0.0001$), suggesting that the set of behavioural beliefs captured overall attitudes moderately well.

The aggregate index of the 5 normative beliefs, each multiplied by motivation to comply, had a correlation of 0.42 ($P<0.0001$) with the direct measure of subjective norms, indicating a reasonably moderate relationship between the two measures.

The control beliefs, however, did not correlate well with the direct measure of perceived behavioural control. The correlation between the belief-based index of 8 control factors and the direct measure of perceived behavioural control was 0.26 ($P<0.0001$). It appears the control factors identified in the structured interviews failed to capture the important considerations related to perceived behavioural control. However, when the indirect measure of self-efficacy (i.e., internal control factors) was correlated against the direct measure of self-efficacy, the correlation coefficient was 0.34 ($P<0.0001$), indicating that the set of self-efficacy beliefs captured the overall feeling of self-efficacy reasonably well. However, the correlation between the belief-based index of the external control factors and the direct measure of perceived control over external factors was 0.12 ($P<0.0001$), indicating that the external control factors did not really explain a person's perception of the control they have over visiting the dentist.

Table 5.29: **Correlation between belief-based measures and respective global measures**

Belief-based measures	Correlation coefficients[#] Global measures ATT	SN	PBC	SE	PC
Att=bxe	0.353**				
Sn=nbxmc		0.415**			
Pbc=cxp			0.262**		
- Se=cxp				0.344**	
- Pc=cxp					0.115**

Spearman's rho correlation coefficient
** Correlation is significant at the 0.0001 level (2-tailed) (i.e., P<0.0001)

5.7.7.1 Distribution of belief-based measures

The distribution of the belief-based measures of attitudes, subjective norms and perceived behavioural control (broken down into measures of self-efficacy and perceived control) are displayed in Table 5.30. Mean scores represent average belief-based measure scores across the total sample. The mean score of the belief-based measure of attitudes across the sample reflected moderate positive attitudes towards dental visiting and the average normative belief score of the sample reflected fairly weak positive social pressure to visit the dentist. The overall mean score of the belief-based measure of perceived behavioural control across the sample indicated a small level of negative control, i.e., visiting the dentist for study participants was somewhat difficult (both in terms of self-efficacy concerns and perceptions of control).

Table 5.30: **Belief-based measures: means, standard deviations, and range of scores**

Variable	n	Min	Max	Mean	SD
Attitudes[a] (Att)	514	-162.00	162.00	59.224	42.940
Subjective norms[b] (Sn)	498	-102.00	105.00	35.203	30.791
Perceived behavioural control[c] (Pbc)	513	-57.00	34.00	-8.653	15.330
- Self-efficacy[d] (Se)	380	-27.00	9.00	-2.763	6.561
- Perceived control[e] (Pc)	511	-42.00	34.00	-6.632	13.200

a Minimum score=–162, Maximum=+162
b Minimum score=–105, Maximum=+105
c Minimum score=–72, Maximum=+72, d Minimum score=–27, Maximum=+27, e Minimum score=–45, Maximum=+45

5.7.7.2 Behavioural beliefs

To develop an understanding of the role of attitudinal considerations in the determination of intentions and behaviour, behavioural beliefs and outcome evaluations were examined. The means and standard deviations for respondents' perceptions of visiting the dentist as reflected in each of the 18 behavioural beliefs are shown in Table 5.31. It is immediately evident that most beliefs about dental visiting were strongly and almost universally held. Inspection of Table 5.31 shows that overall, adults using public dental services held relatively favourable beliefs about the consequences of visiting the dentist. They believed strongly that doing so would prevent tooth decay, keep their teeth healthy, prevent future problems with their teeth, mouth or dentures, keep their teeth looking good, prevent pain in their teeth, mouth or dentures, maintain good oral health, allow for the receipt of preventive treatment or restorations, allow them to receive dental advice from a dental professional and get any dental problems fixed if needed. They also valued all of these consequences quite positively (i.e., mean scores for each evaluated belief were above the midpoint of 0 with the majority of mean scores well over 2 on the –3 to +3 scale, so nothing on this list can be safely disregarded). There was quite a good correspondence between what people perceived to be outcomes of visiting the dentist and what was important to them. For example, keeping teeth healthy was perceived to be both an outcome of visiting the dentist and important.

Table 5.31: Behavioural beliefs – belief strength, outcome evaluation and product scores: means and standard deviations

Outcome	Belief strength (b)			Outcome evaluation (e)			Product score (b_ie_i)		
I think that by visiting the dentist I will...	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Prevent tooth decay	508	1.482	1.666	512	2.564	1.018	508	4.034	4.858
Keep teeth healthy	507	1.972	1.252	513	2.610	0.875	506	5.267	4.001
Prevent future problems with teeth, mouth or dentures	504	1.879	1.420	509	2.621	0.867	501	5.066	4.317
Keep teeth looking good	508	1.742	1.388	511	2.425	0.951	506	4.549	3.993
Prevent pain in teeth, mouth or dentures	509	1.949	1.228	511	2.632	0.884	507	5.251	3.856
Have good oral health	509	1.884	1.325	512	2.619	0.831	509	5.118	3.987
Receive preventive treatments	506	1.577	1.603	510	2.418	0.932	504	4.024	4.519
Have teeth cleaned	509	1.332	1.850	508	2.100	1.097	503	3.179	4.734
Receive fillings to fix dental decay	509	1.796	1.509	512	2.574	0.921	508	4.911	4.386
Receive unnecessary extractions†	506	1.502	1.845	512	2.615	0.960	505	3.937	5.394
Prevent loss of teeth	508	1.150	1.862	513	2.288	1.015	506	3.000	4.837
Receive dental advice from a dental professional	509	1.986	1.280	511	2.611	0.928	508	5.270	4.142
Get dental problems fixed if there were any problems to be fixed	509	2.114	1.221	511	1.988	1.057	505	4.236	3.704
Have to wait a long time in the waiting room for the appointment†	509	-0.306	1.721	511	2.460	1.231	508	-0.661	4.823
Experience painful dental treatment†	510	0.375	1.815	510	2.224	1.124	509	1.138	4.662
Seen promptly	509	0.485	1.670	512	1.541	1.079	511	0.616	3.418
Afraid about the dental visit†	510	0.625	2.028	511	1.411	1.315	508	0.774	4.535
Anxious about the dental visit†	510	0.251	2.094	509	1.283	1.394	508	0.443	4.523

† item corrected for direction of response

Note. Behavioural belief strength (b) and outcome evaluation (e) scored from –3 to +3.

Note. Behavioural belief strength (b) x outcome evaluation (e) score ranges from –9 to +9

b_ie_i = Behavioural belief strength for outcome i x outcome evaluation for outcome i (i=1...18)

Regarding the correlations of each of the behavioural beliefs with intentions and attitudes, it can be seen that a range of beliefs about dental visiting were associated with intentions to visit and attitudes towards visiting (see Table 5.32). Correlations were higher with attitudes than with intentions, which is generally the case in the social sciences, where perceptual measures tend to be more connected with attitudes than with behaviours. Therefore it appeared that people's perceptions of the outcomes of visiting the dentist influenced their attitudes towards visiting more so than their intentions to do so.

The perceptions of outcomes of dental visiting that were most strongly connected to attitudes also tended to be those most strongly connected to intentions. The behavioural beliefs that were most strongly connected to both attitudes and intentions were with 'keep teeth healthy', 'prevent future problems' and 'have good oral health'. This indicated that people were first and foremost looking holistically at the experience of visiting the dentist in terms of longer-term oral health outcomes. This was an important finding. In addition, outcomes such as 'prevent tooth decay', 'keep teeth looking good', 'prevent pain in teeth, mouth or dentures', 'receive preventive treatments', 'receive fillings to fix dental decay' and 'prevent loss of teeth' were also among the beliefs to have a higher correlation with both attitudes and intentions. However, in order to gain further insights, other individual belief items needed to be examined. Thus, upon examination of the other behavioural beliefs, not being dentally anxious, having teeth cleaned, receiving dental advice from a dental professional and being seen promptly were also important correlates of intentions. The more that people thought that visiting the dentist offered these things, the more likely they were to say that they intended to visit the dentist. Thus, strengthening these perceptions should also strengthen people's intention to visit the dentist. It is important to note that commonly cited 'downsides' of visiting the dentist appeared only weakly to undermine intentions. These included receiving unnecessary extractions, having to wait a long time in the waiting room for the scheduled appointment, experiencing painful dental treatment and being dentally afraid. Thus, 'downsides' of visiting the dentist tended to put respondents off only slightly, and this was more than counteracted by the extent to which the positive beliefs encouraged them to consider visiting the dentist. Behavioural beliefs that showed statistically significant correlations with intentions were, however, mostly small.

Table 5.32: Behavioural beliefs – correlations with direct measures of attitude and intention

Outcome	Correlation#			
I think that by visiting the dentist I will…	b_ie_i with ATT		b_ie_i with I	
Prevent tooth decay	0.282	**	0.174	**
Keep teeth healthy	0.379	**	0.203	**
Prevent future problems with teeth, mouth or dentures	0.325	**	0.179	**
Keep teeth looking good	0.306	**	0.133	**
Prevent pain in teeth, mouth or dentures	0.337	**	0.144	**
Have good oral health	0.364	**	0.197	**
Receive preventive treatments	0.299	**	0.126	**
Have teeth cleaned	0.185	**	0.133	**
Receive fillings to fix dental decay	0.364	**	0.160	**
Receive unnecessary extractions†	0.146	**	0.035	
Prevent loss of teeth	0.268	**	0.136	**
Receive dental advice from a dental professional	0.336	**	0.100	*
Get dental problems fixed if there were any problems to be fixed	0.271	**	0.061	
Have to wait a long time in the waiting room for the appointment†	-0.013		0.017	
Experience painful dental treatment†	0.057		0.036	
Seen promptly	0.051		0.093	*
Afraid about the dental visit†	0.077		0.080	
Anxious about the dental visit†	0.092	*	0.139	**

Spearman's rho correlation coefficient

† item corrected for direction of response

b_ie_i = Behavioural belief strength x outcome evaluation, I=intentions, ATT=Attitudes

* Correlation is significant at the 0.05 level (2-tailed) (P<0.05)

** Correlation is significant at the 0.01 level (2-tailed) (P<0.01)

5.7.7.3 Normative beliefs

To develop an understanding of the perceived social pressure in the determination of intentions and behaviour, normative beliefs and motivation to comply were examined. As seen in Table 5.33, participants generally felt strong social pressure to visit the dentist. The results concerning specific normative beliefs, displayed in Table 5.33, showed that this social pressure was perceived to come from all important referents. Family, partner, parent/s, mother and friend/s were all viewed as strongly in support of them visiting a dentist (mean scores were well above the midpoint of 0, with scores ranging from 1.8 to 2.3). In addition, respondents were generally motivated to comply with family and partner (mean scores were greater than the midpoint of 4) but not so much with parent/s, mother and friend/s (mean scores fell just below the midpoint of 4).

Table 5.33: Normative beliefs – normative belief strength, motivation to comply and product scores: means and standard deviations

	Normative belief strength (nb)			Motivation to comply (mc)			Product score (nb_jmc_j)		
Normative referent	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Family	483	2.257	1.198	479	4.411	2.347	477	10.895	8.381
Partner	367	2.253	1.241	364	4.942	2.324	362	12.251	9.008
Parent/s	260	1.873	1.363	259	3.857	2.318	256	8.543	8.323
Mother	251	1.920	1.351	251	3.964	2.360	249	8.924	8.486
Friend/s	433	1.824	1.339	429	3.793	2.363	427	8.173	8.228

Note. Normative belief strength scored from –3 to +3 (strongly disapprove to strongly approve) and motivation to comply scored from +1 to +7 (Not at all to Very much).

Note. Normative belief strength (nb) x motivation to comply (mc) score ranges from –21 to +21

nb_jmc_j = Normative belief strength for referent j x motivation to comply with referent j (j=1...5)

Regarding the correlations with each of the normative beliefs with intentions and subjective norms, it can be seen from Table 5.34 that normative beliefs concerning family, parent/s and friend/s had a significant, positive correlation with intentions (these correlations were found to be 0.118, 0.163 and 0.119 respectively), and all normative referents had a significant, positive correlation with subjective norms (correlations ranged from 0.429 to 0.493) and with attitudes towards visiting the dentist (correlations ranged from 0.196 to 0.239).

The correlation between intentions and the normative beliefs concerning family, parent/s and friends, although somewhat small, suggested that the opinions of family, parent/s and friend/s have a significant impact on the likelihood that a person will visit the dentist. This finding is particularly noteworthy as the mean scores assessing motivation to comply with family, parent/s and friend/s were particularly low for parent/s (mean score was found to be 3.857) and friend/s (mean score was found to be 3.793). In other words, respondents were not too concerned with complying with the wishes of their parent/s and friend/s. Yet, as just seen, the opinion of parent/s and friend/s was a good statistical predictor of intention to visit the dentist. Perhaps respondents were unaware of the influence their parent/s or friend/s had upon them. The significant correlation of family with intentions indicated that the opinion of family was also an important predictor of intention to visit the dentist. Overall, these correlations suggested that the opinions of family, parent/s and friend/s have considerable impact on the likelihood that a person will visit the dentist.

Table 5.34: **Normative beliefs – correlations with direct measures of intention, subjective norm and attitude**

Normative referent	Correlation#					
	nb_jmc_j with I		nb_jmc_j with SN		nb_jmc_j with ATT	
Family	0.118	*	0.483	**	0.218	**
Partner	0.102		0.487	**	0.196	**
Parent/s	0.163	**	0.429	**	0.206	**
Mother	0.140	*	0.458	**	0.237	**
Friend/s	0.119	*	0.493	**	0.239	**

Spearman's rho correlation coefficient
nb_jmc_j = Normative belief strength x motivation to comply, I=intentions, SN=subjective norms, ATT=attitudes
* Correlation is significant at the 0.05 level (2-tailed) (P<0.05)
** Correlation is significant at the 0.01 level (2-tailed) (P<0.01)

5.7.7.4 Control beliefs

The means for control belief items and their correlations with intentions and behaviour are shown in Table 5.35. Participants expressed varying levels of difficulty associated with each of the control factors with regards to visiting the dentist (mean scores fell below the midpoint of 0). Thus, the first point to note is that the mean scores for control belief strength (highest –0.164 and lowest –2.34) suggested that the majority of the factors were consistently perceived as a major barrier. In particular, participants felt that costly dental treatment, long waiting lists, having to pay a gap/co-payment, being dentally afraid, being dentally anxious and/or having had bad past dental experiences would make visiting the dentist difficult. In fact, having to pay for treatment regardless of the amount was considered by participants to make dental visiting quite difficult. In relation to the influence or power of each control factor on dental visiting, participants indicated that they expected there to be long waiting lists, that they would have to pay a gap/co-payment, that dental treatment would be costly and that they would not be able to choose the dentist who treated them if they were to visit the dentist (mean scores above the midpoint of 0), and that they did not expect to have a bad dental experience, be afraid or anxious about their dental visit, or find the dental clinic inconveniently located (mean scores below the midpoint of 0). Upon examination of product scores for each control factor, participants generally expressed a lack of control in relation to long waiting lists, the cost associated with visiting the dentist, having bad dental experiences, being able to choose the dentist who treats them and being afraid or anxious about their dental visit (as indicated by negative mean product scores on each of these factors). Respondent did however express a moderate level of control in relation to the location of the dental clinic (as indicated by a positive mean product score on this factor).

Table 5.35: Control beliefs – control belief strength, control power and product scores: means and standard deviations

	Control belief strength (c)			Control power (p)			Product score (c_kp_k)		
Control factor	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Long waiting lists	512	-1.740	1.229	497	1.636	1.858	501	-3.164	4.693
Costly dental treatment	513	-2.339	1.069	499	0.924	2.216	499	-2.589	5.880
Having to pay a gap, i.e., co-payments	508	-1.409	1.345	498	1.329	1.952	495	-1.634	4.598
Bad dental experience†	226	-1.102	1.383	498	-0.898	1.870	284¥	-0.595	3.260
Not having choice of dentist	511	-0.589	1.439	503	0.928	2.003	506	-0.462	3.722
Being afraid about the dental visit†	196	-1.250	1.152	501	-0.631	2.138	240¥	-1.679	3.288
Being anxious about the dental visit†	219	-1.164	1.146	502	-0.133	2.157	267¥	-1.790	3.160
Convenient location of dental clinic‡	512	-0.164	1.769	501	-0.611	2.031	502	1.058	4.121
Having to pay for dental treatment, regardless of the amount	512	-2.172	1.108						

† these items were only asked of people who responded 'Yes' to having had a bad dental experience in the past, being dentally anxious and/or being dentally afraid

‡ item corrected for direction of response in the measurement of control belief strength

¥ represents only those people who responded 'Yes' to having had a bad dental experience in the past, being dentally anxious and/or being dentally afraid

Note. Control belief strength scored from –3 to +3 (extremely difficult to extremely easy) and Control power scored from –3 to +3 (strongly disagree to strongly agree).

Note. Behavioural = Control belief strength (c) x control power (p) score ranges from –9 to +9

c_kp_k = Control belief strength for factor k x control power for factor k (k=1...8)

The belief about there being long waiting lists correlated –0.172 with attitudes and –0.098 with intentions. In other words, there was a tendency for respondents who saw this factor as a barrier to have negative attitudes towards visiting the dentist, and a weaker tendency not to intend to visit the dentist (see Table 5.36).

Table 5.36: Control beliefs – correlations with direct measures of intention, perceived behavioural control and attitude

Control factor	Correlation# $c_k p_k$ with I		$c_k p_k$ with PBC		$c_k p_k$ with ATT	
Long waiting lists	-0.098	*	0.133	**	-0.172	**
Costly dental treatment	0.026		0.165	**	-0.040	
Having to pay a gap, i.e., co-payments	0.001		0.170	**	0.033	
Bad dental experience†	-0.006		0.120	*	0.048	
Not having choice of dentist	-0.073		0.102	*	-0.018	
Being afraid about the dental visit†	0.027		0.172	**	0.079	
Being anxious about the dental visit†	0.109		0.248	**	0.017	
Inconvenient location of dental clinic	0.031		-0.012		0.033	
Having to pay for dental treatment, regardless of the amount						

Spearman's rho correlation coefficient
$c_k p_k$ = Control belief strength x control power, I=intention, PBC=Perceived behavioural control, ATT=attitudes
* Correlation is significant at the 0.05 level (2-tailed) (P<0.05)
** Correlation is significant at the 0.01 level (2-tailed) (P<0.01)

Associations between the strength of individual control beliefs and the direct measures of self-efficacy and perceived control were examined to determine whether or not the notion of self-efficacy and perceived control as distinct constructs were reflected in these beliefs. Correlations between individual control beliefs and direct measures of self-efficacy and perceived control are shown in Table 5.37. Perceived control was significantly related to external beliefs (albeit weakly) in relation to dental visiting such as long waiting lists, costly dental treatment or having to pay for dental care, and not being able to choose the treating dentist. Self-efficacy on the other hand was also associated with three of these external beliefs and also with internal beliefs such as bad dental experiences, dental fear and dental anxiety. These associations suggested that the perceived control construct within this framework was related to the external barriers to dental visiting, whereas self-efficacy was characterised by beliefs directed at internal aspects of control in relation to dental visiting. However, self-efficacy also appeared to be related, although weakly, to external beliefs, suggesting that self-efficacy concerns were not independent of concerns relating to perceived external barriers.

Table 5.37: Correlations between control beliefs and direct measures of self-efficacy and perceived control

	Correlations#	
Control belief strength	Direct measure of SE	Direct measure of PC
Long waiting lists	0.077	0.186*
Costly dental treatment	0.073	0.131*
Having to pay a gap, i.e., co-payments	0.164*	0.110*
Bad dental experience	0.127*	0.109*
Not having choice of dentist	-0.120*	-0.083
Being afraid about the dental visit	0.122*	0.096*
Being anxious about the dental visit	0.431*	0.025
Convenient location of dental clinic	0.380*	-0.130
Having to pay for dental treatment, regardless of the amount	0.446*	-0.067

Spearman's rho correlation coefficient

* Correlation is significant at the 0.05 level (2-tailed).

5.7.7.5 Belief-based measures by dental visiting intentions

Lower intenders and higher intenders were subsequently compared with respect to 18 behavioural beliefs and the corresponding product scores; 5 normative beliefs and the corresponding product scores; and 8 control beliefs and the corresponding product scores.

Behavioural beliefs by intender type

Bivariate associations between intender types and behavioural beliefs and their corresponding product scores are shown in Table 5.38. The mean scores provide information of how likely or strongly the cognitive measures were held.

Ten of the 18 behavioural belief strengths significantly discriminated between lower and higher intenders. Those classified as higher intenders considered the following perceived benefits of visiting the dentist more likely to occur: prevention of tooth decay, maintaining healthy teeth, prevention of future problems, keeping teeth looking good, prevention of pain, good oral health, receipt of preventive treatments, having teeth cleaned, receipt of necessary fillings and being seen promptly for dental appointment.

Regarding the evaluation of perceived outcomes of visiting the dentist, two of the 18 outcome evaluations significantly discriminated between lower and higher intenders. Higher intenders rated having teeth cleaned and preventing tooth loss as more important than low intenders. Note that for each of the 18 outcome evaluations, mean scores were above the scale midpoint of 0, indicating that both groups valued each of the perceived outcomes of visiting the dentist.

Product scores for 7 of the behavioural beliefs discriminated significantly between lower and higher intenders, with higher intenders having higher positive scores on attitudes towards prevention of tooth decay, maintaining healthy teeth, prevention of future problems, keeping teeth looking good, good oral health, being seen promptly for their dental appointment and dental anxiety. A mean negative product score was obtained for lower intenders in relation to dental anxiety, indicating that lower intenders perceived that they would be anxious about visiting the dentist.

Table 5.38: Behavioural belief strength, outcome evaluations and corresponding product scores for intender types: means

Outcome	Belief strength (b)			Outcome evaluation (e)			Product score (b_ie_i)		
I think that by visiting the dentist I will...	LI	HI		LI	HI		LI	HI	
Prevent tooth decay	1.261	1.629	*	2.500	2.609		3.495	4.381	*
Keep teeth healthy	1.743	2.148	***	2.537	2.664		4.604	5.758	**
Prevent future problems with teeth, mouth or dentures	1.650	2.051	**	2.553	2.673		4.391	5.562	**
Keep teeth looking good	1.583	1.863	*	2.358	2.475		4.143	4.852	*
Prevent pain in teeth, mouth or dentures	1.803	2.050	*	2.606	2.647		4.890	5.491	
Have good oral health	1.711	2.004	*	2.541	2.681		4.477	5.577	**
Receive preventive treatments	1.417	1.699	*	2.321	2.484		3.590	4.353	
Have teeth cleaned	1.142	1.489	*	1.926	2.220	**	2.767	3.498	
Receive fillings to fix dental decay	1.621	1.914	*	2.528	2.602		4.482	5.180	
Receive unnecessary extractions†	1.592	1.419		2.528	2.681		4.115	3.762	
Prevent loss of teeth	1.018	1.242		2.169	2.373	*	2.702	3.207	
Receive dental advice from a dental professional	1.881	2.076		2.608	2.609		5.037	5.457	
Get dental problems fixed if there were any problems to be fixed	2.123	2.115		1.954	2.000		4.124	4.322	
Have to wait a long time in the waiting room for the appointment†	-0.279	-0.381		2.450	2.525		-0.761	-0.633	
Experience painful dental treatment†	0.420	0.323		2.321	2.191		1.110	1.177	
Seen promptly	0.260	0.644	*	1.619	1.487		0.224	0.928	*
Afraid about the dental visit†	0.548	0.670		1.548	1.323		0.516	0.961	
Anxious about the dental visit†	0.205	0.258		1.406	1.223		-0.092	0.885	*

† item corrected for direction of response
Note. Behavioural belief strength and outcome evaluation scored from –3 to +3.
bxe = Behavioural belief strength x outcome evaluation
*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

Normative beliefs by intender type

Bivariate associations between intender types and normative beliefs and their corresponding product scores are shown in Table 5.39. All normative belief strength measures discriminated between lower intenders and higher intenders, with higher intenders reporting higher mean scores in relation to perceiving that their family, partner, parent/s, mother and friend/s would approve of them visiting the dentist (i.e., beliefs about the approval of family, partner, parent/s, mother and friend/s were more likely among higher intenders than low intenders). Regarding motivation to comply, there were no significant differences between intender types, with higher intenders and lower intenders yielding rather similar mean scores. As a group, higher intenders and lower intenders were not highly motivated to comply with friend/s and parent/s.

Product scores could range from –21 to +21, so scores around +10.5, for example, were considered to reflect moderate positive social pressure to visit the dentist. Thus, among product scores, a moderate level of positive pressure to visit the dentist was perceived to come from one's partner and family, with higher intenders reporting a significantly higher mean score for both these referents. There was a fairly weak amount of perceived positive pressure stemming from parent/s and friend/s to visit the dentist, with higher intenders reporting a significantly higher mean score (albeit weak) for both these referents.

Table 5.39: Normative belief strength, motivation to comply and corresponding product scores for intender types: means

	Normative belief strength (nb)			Motivation to comply (mc)		Product score ($nb_j mc_j$)		
Normative referent	LI	HI		LI	HI	LI	HI	
Family	2.020	2.436	***	4.410	4.429	9.912	11.745	*
Partner	1.987	2.473	***	4.858	4.995	11.071	13.256	*
Parent/s	1.605	2.122	**	3.820	3.901	7.298	9.615	*
Mother	1.636	2.172	**	4.017	3.913	7.880	9.724	
Friend/s	1.519	2.045	***	3.683	3.887	6.883	9.168	**

Note. Normative belief strength scored from –3 to +3 and Motivation to comply scored from +1 to +7
nbxmc = normative belief strength x motivation to comply
*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

Control beliefs by intender type

Bivariate associations between intender types and control beliefs and their corresponding product scores are shown in Table 5.40. Mean scores for all control belief strengths measuring perceived internal and external barriers to visiting the dentist fell below zero for each intender type group, indicating that both groups perceived that internal barriers such as bad dental experiences, dental anxiety and fear, and external barriers such as long waiting lists, cost, inconvenient location of the dental clinic and not being able to choose the treating dentist, made visiting the dentist quite difficult. Significant differences in control belief strength measures among intender groups were obtained for beliefs concerning long waiting lists and being dentally anxious. Higher intenders reported a stronger level of associated difficulty with visiting the dentist in relation to long waiting lists, and lower intenders reported a stronger level of difficulty in visiting the dentist as a result of being dentally anxious.

In relation to control power of each of the particular beliefs, participants indicated that they did expect that there would be long waiting lists and dental treatment would be costly or they would have to pay a co-payment if they were to visit the dentist. Expectations about waiting lists were higher among the higher intender group and expectations about cost were higher among the lower intender group. Intender groups indicated a slight level of disagreement toward the expectations that they would have a bad dental experience and be dentally anxious or afraid if they were to visit the dentist. Significant differences in mean control power scores between intender types were found for the belief relating to not being able to choose the treating dentist, with high intenders indicating a higher level of agreement to this expectation.

Higher intenders and lower intenders yielded rather similar mean product scores, with a significant difference found between intender types in relation to not being able to choose the dentist. Higher intenders indicated a higher level of negative control in relation to this belief. Overall, the negative mean product scores for each belief measured (with the exception of clinic location) reflected the lack of control participants felt in relation to each of these perceived barriers when visiting the dentist.

Table 5.40: **Control belief strength, control power and corresponding product scores for intender types: means**

Control factor	Control belief strength (c) LI	HI		Control power (p) LI	HI		Product score ($c_k p_k$) LI	HI	
Long waiting lists	-1.604	-1.868	*	1.528	1.734		-2.853	-3.493	
Costly dental treatment	-2.284	-2.411		1.142	0.766		-3.129	-2.183	
Having to pay a gap, i.e., co-payments	-1.412	-1.419		1.355	1.319		-1.935	-1.481	
Bad dental experience	-1.142	-1.060		-0.728	-1.022		-0.609	-0.607	
Not having choice of dentist	-0.564	-0.612		0.720	1.079	*	-0.050	-0.728	*
Being afraid about the dental visit	-1.323	-1.180		-0.532	-0.716		-1.586	-1.746	
Being anxious about the dental visit	-1.388	-0.991	*	-0.110	-0.178		-2.069	-1.572	
Convenient location of dental clinic†	-0.228	-0.133		-0.633	-0.618		0.829	1.208	
Having to pay for dental treatment, regardless of the amount	-2.115	-2.229							

Note. Control belief strength and Control power scored from –3 to +3
† item corrected for direction of response in the measurement of control belief strength
cxp = control belief strength x control power
*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

5.7.8 Behaviour measure

In this section both self-reported usual reason for visiting the dentist and actual attendance behaviour were examined in order to develop prediction models of dental visiting behaviour. Both these measures of behaviour were examined, as a meta-analysis conducted by Armitage and Conner (2001) revealed that self-reported behaviour was better at predicting behaviour than observed behaviour. As explained by Armitage and Conner, measurement correspondence is maximised when subjective measures of behaviour are used. Nevertheless, observed behaviour was still able to explain some 20% of the variance in prospective measures of actual behaviour. Therefore both measures provide an interesting contrast to explaining and potentially predicting behaviour.

5.7.8.1 Self-reported usual reason for dental visit

The usual reason for a dental visit was assessed by a single question that asked: 'What is your usual reason for visiting the dentist?' Response choices were: 'for a regular check-up', 'for an occasional check-up', 'when in pain or discomfort', or 'when something needs to be fixed'. Patients were given the option of selecting one or more of these response choices in order to best capture their usual reason for visiting the dentist. Responses to this question were later recoded. Responses falling into the first two categories were collapsed to create a category representing asymptomatic dental visiting (i.e., category labelled 'Check-up'), responses falling into the last two categories were collapsed to create a category representing symptomatic dental visiting (i.e., category labelled 'Pain/problem'), while responses falling into either of the first two categories and either of the last two categories were collapsed to create a category representing both symptomatic and asymptomatic dental visiting (i.e., category labelled 'Check-up and pain/problem'). As presented in Table 5.41, almost two-thirds of respondents reported that a dental problem or pain was their usual reason for visiting the dentist, 14.6% reported that a check-up was their usual reason for visiting the dentist, and 20% reported both a check-up and problem/pain as the reason for usually visiting the dentist.

A dichotomous variable with the categories 'Problem/pain' or 'Other reason' (i.e., check-up or check-up and pain/problem) was further created from this variable to derive a variable of symptomatic dental visiting only, in contrast to other types of dental visiting (i.e., asymptomatic or otherwise) (see Table 5.41). This dichotomised variable will be used in subsequent analyses.

Table 5.41: Proportion of persons by self-reported usual reason for visiting the dentist

Self-reported usual reason for visiting the dentist	*n*	Percent
Pain/problem	336	65.4
Check-up	75	14.6
Check-up and pain/problem	103	20.0
Total	514	100.0

Self-reported usual reason for visiting the dentist	*n*	Percent
Problem/pain	336	65.4
Other	178	34.6
Total	514	100.0

Global measures by self-reported usual reason for dental visit

Bivariate associations between self-reported usual reason for visiting the dentist and direct measures of intentions, attitudes, subjective norms and perceived behavioural control were examined. Table 5.42 summarises the differences between 'Problem/pain' attenders and 'Other' attender types based on self-reported dental visiting behaviour on each of the components of the TPB. These results show that there were significant differences between 'Problem/pain' attenders and 'Other' attenders on two of the components of the TPB, with 'Other' attenders having slightly stronger intentions to visit the dentist and also reporting greater perceptions of behavioural control over visiting the dentist (i.e., perceived self-efficacy was significantly higher among 'Other' attenders') compared to 'Problem/pain' attenders. Both attender groups were reasonably similar with regards to attitudes, perceived social pressure and perceptions of control regarding visiting the dentist. Both groups reported strong positive attitudes toward dental visiting, perceived similar levels of normative pressure to visit the dentist and believed that they had a reasonable amount of control over visiting the dentist.

Table 5.42: Intention, attitude, subjective norm, and perceived behavioural control by self-reported usual reason for visiting the dentist: means and standard deviations

	Self-reported usual reason for visiting the dentist						
	Problem/pain			Other			
Variable	*n*	Mean	SD	*n*	Mean	SD	
Intentions (I)	325	5.358	1.607	174	5.842	1.452	***
Attitudes (ATT)	331	6.264	0.751	175	6.337	0.637	
Subjective norms (SN)	332	5.604	1.368	176	5.786	1.281	
Perceived behavioural control (PBC)	332	5.591	1.309	175	5.894	1.106	**
- Self-efficacy (SE)	332	5.063	1.428	175	5.551	1.100	***
- Perceived control (PC)	331	5.941	1.680	174	6.134	1.491	

*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

Belief-based measures by self-reported usual reason for dental visit

Bivariate associations between self-reported usual reason for visiting the dentist and indirect measures of attitude, subjective norm and perceived behavioural control (broken down into measures of self-efficacy and perceived control) were examined. Table 5.43 summarises the differences between 'Problem/pain' attenders and 'Other' attender types based on self-reported usual reason for visiting the dentist for each of the belief-based measures. These results show that there were significant differences between 'Problem/pain' attenders and 'Other' attenders on three of the components of the TPB. 'Other' attenders reported having a more positive attitude toward dental visiting compared to 'Problem/pain' attenders. The mean perceived behavioural control score of the two groups indicated a small level of negative control over visiting the dentist. 'Problem/pain' attenders reported significantly lower perceptions of control over visiting the dentist than 'Other' attenders, particularly in relation to self-efficacy concerns where mean scores on this component were significantly lower for the Problem/pain' attenders compared to 'Other' attenders. Both attender groups perceived similar levels of normative pressure to visit the dentist and reported similar levels of perceived control, albeit negative, regarding visiting the dentist.

Table 5.43: Belief-based measures of attitude, subjective norm, and perceived behavioural control by self-reported usual reason for visiting the dentist: means and standard deviations

	Self-reported usual reason for visiting the dentist						
	Problem/pain			Other			
Variable	*n*	Mean	SD	*n*	Mean	SD	
Attitude[a] (Att)	334	61.961	41.569	177	76.068	40.190	***
Subjective norm[b] (Sn)	326	34.227	31.806	169	36.964	28.378	
Perceived behavioural control[c] (Pbc)	334	-9.817	16.172	176	-6.585	13.428	*
- Self-efficacy[d] (Se)	245	-3.441	7.252	133	-1.511	4.881	**
- Perceived control[e] (Pc)	332	-7.337	13.560	176	-5.443	12.473	

a Minimum score=–162, Maximum=+162
b Minimum score=–105, Maximum=+105
c Minimum score=–72, Maximum=+72, d Minimum score=–27, Maximum=+27, e Minimum score=–45, Maximum=+45
*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

Behavioural beliefs

Strength of behavioural beliefs and outcome evaluations were examined among those reporting a problem and/or pain as their usual reason for visiting the dentist (coded as 'Problem/pain') and those reporting a check-up or check-up and problem/pain as their usual reason for visiting the dentist (coded as' Other'). Table 5.44 and Table 5.45 summarise these results.

Mean scores on the behavioural belief items showed significant differences between the two groups on various beliefs about visiting the dentist. In comparison to 'Other' attenders, 'Problem/pain' attenders reported significantly lower mean scores (indicating beliefs about the benefits of visiting the dentist were not as strong as 'Other' attender types) in relation to beliefs about preventing tooth decay, keeping teeth healthy, preventing future dental problems, keeping teeth looking good, maintaining good oral health, receiving preventive treatment, having teeth cleaned, preventing tooth loss, receiving dental advice and being seen promptly. Despite these differences, however, 'Problem/pain' attenders still perceived that these particular outcomes of dental visiting (behavioural beliefs) were likely (mean scores above 0) (see Table 5.44).

Table 5.44: Belief strength by self-reported usual reason for visiting the dentist: means and standard deviations

Outcome *(I think that by visiting the dentist I will…)*	Usual reason for visiting the dentist: Problem/pain *n*	Mean	SD	Other *n*	Mean	SD	
Prevent tooth decay	331	1.320	1.768	175	1.794	1.411	**
Keep teeth healthy	329	1.839	1.400	176	2.233	0.860	***
Prevent future problems with teeth, mouth or dentures	327	1.728	1.569	175	2.154	1.042	***
Keep teeth looking good	331	1.622	1.499	175	1.977	1.119	**
Prevent pain in teeth, mouth or dentures	330	1.894	1.318	177	2.040	1.041	
Have good oral health	332	1.720	1.453	175	2.183	0.977	***
Receive preventive treatments	331	1.450	1.698	173	1.815	1.385	*
Have teeth cleaned	330	1.061	1.981	177	1.859	1.421	***
Receive fillings to fix dental decay	331	1.770	1.538	176	1.830	1.460	
Receive unnecessary extractions†	329	1.511	1.855	175	1.503	1.806	
Prevent loss of teeth	330	1.012	1.930	176	1.426	1.682	*
Receive dental advice from a dental professional	331	1.915	1.370	176	2.142	1.018	*
Get dental problems fixed if there were any problems to be fixed	329	2.067	1.300	178	2.225	0.989	
Have to wait a long time in the waiting room for the appointment†	331	-0.363	1.743	176	-0.199	1.687	
Experience painful dental treatment†	332	0.280	1.874	176	0.557	1.686	
Seen promptly	331	0.248	1.707	176	0.926	1.501	***
Afraid about the dental visit†	332	0.578	2.070	176	0.705	1.952	
Anxious about the dental visit†	332	0.178	2.150	176	0.375	1.985	

† item corrected for direction of response
Note. Behavioural belief strength scored from –3 to +3
*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

Each group evaluated the importance or good of all outcomes quite positively (see Table 5.45). 'Problem/pain' attenders, however, reported significantly lower mean scores in their evaluation of the importance of keeping teeth healthy and having teeth cleaned when compared to 'Other' attenders.

Table 5.45: Outcome evaluation by self-reported usual reason for visiting the dentist: means and standard deviations

	Usual reason for visiting the dentist						
	Problem/pain			Other			
Outcome *(I think that by visiting the dentist I will...)*	*n*	Mean	SD	*n*	Mean	SD	
Prevent tooth decay[a]	333	2.511	1.037	176	2.659	0.984	
Keep teeth healthy[a]	333	2.550	0.879	177	2.718	0.866	*
Prevent future problems with teeth, mouth or dentures[a]	331	2.577	0.865	176	2.699	0.872	
Keep teeth looking good[a]	333	2.384	0.926	175	2.503	0.994	
Prevent pain in teeth, mouth or dentures[a]	333	2.619	0.893	175	2.651	0.877	
Have good oral health[a]	333	2.598	0.803	176	2.653	0.888	
Receive preventive treatments[a]	332	2.377	0.896	175	2.486	0.999	
Have teeth cleaned[a]	330	1.994	1.127	175	2.297	1.019	**
Receive fillings to fix dental decay[a]	333	2.547	0.929	176	2.625	0.911	
Receive unnecessary extractions[†b]	333	2.604	0.993	176	2.631	0.904	
Prevent loss of teeth[a]	333	2.240	1.040	177	2.379	0.970	
Receive dental advice from a dental professional[a]	332	2.590	0.952	176	2.642	0.889	
Get dental problems fixed if there were any problems to be fixed[a]	332	2.033	1.032	176	1.915	1.095	
Have to wait a long time in the waiting room for the appointment[†b]	332	2.500	1.193	176	2.375	1.308	
Experience painful dental treatment[†b]	331	2.254	1.132	176	2.170	1.118	
Seen promptly[a]	333	1.598	1.076	176	1.455	1.079	
Afraid about the dental visit[†b]	332	1.440	1.364	176	1.369	1.221	
Anxious about the dental visit[†b]	330	1.330	1.447	176	1.227	1.271	

† item corrected for direction of response
a Outcome evaluation scored from –3 to +3 (extremely unimportant to extremely important)
b Outcome evaluation scored from –3 to +3 (extremely bad to extremely good)
*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

In general, both attender types perceived that the outcomes of dental visiting (behavioural beliefs) encouraged dental visiting/attendance (i.e., contributing to a positive attitude toward dental visiting) (mean scores above 0), except for the belief about having to wait a long time in the waiting room for the set appointment, which they indicated would discourage dental attendance (contributing to a negative attitude toward dental visiting) (mean scores below 0) (see Table 5.46).

Table 5.46: Product score (i.e., b_ie_i) by self-reported usual reason for visiting the dentist: means and standard deviations

	Usual reason for visiting the dentist						
	Problem/pain			Other			
Outcome *(I think that by visiting the dentist I will...)*	*n*	Mean b_ie_i	SD	*n*	Mean b_ie_i	SD	
Prevent tooth decay	331	3.580	5.015	175	4.903	4.451	**
Keep teeth healthy	328	4.817	4.273	176	6.131	3.285	***
Prevent future problems with teeth, mouth or dentures	324	4.654	4.564	175	5.800	3.731	**
Keep teeth looking good	330	4.264	4.158	174	5.132	3.608	*
Prevent pain in teeth, mouth or dentures	330	5.170	4.017	175	5.360	3.543	
Have good oral health	332	4.687	4.181	175	5.891	3.468	**
Receive preventive treatments	330	3.718	4.600	172	4.587	4.338	*
Have teeth cleaned	326	2.561	4.858	175	4.377	4.235	***
Receive fillings to fix dental decay	330	4.858	4.368	176	4.966	4.436	
Receive unnecessary extractions†	328	3.866	5.437	175	4.114	5.251	
Prevent loss of teeth	329	2.805	4.857	175	3.429	4.726	
Receive dental advice from a dental professional	330	5.094	4.297	176	5.659	3.681	
Get dental problems fixed if there were any problems to be fixed	327	4.229	3.855	176	4.278	3.424	
Have to wait a long time in the waiting room for the appointment†	330	-0.858	4.915	176	-0.284	4.661	
Experience painful dental treatment†	331	0.828	4.840	176	1.733	4.263	*
Seen promptly	332	0.292	3.485	176	1.244	3.234	**
Afraid about the dental visit†	330	0.539	4.710	176	1.222	4.189	
Anxious about the dental visit†	330	0.242	4.744	176	0.824	4.091	

† item corrected for direction of response
b_ie_i = Behavioural belief strength for outcome i x outcome evaluation for outcome i (i=1…18), range=–9 to +9
*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

Normative beliefs

Normative belief strength and motivation to comply with normative referents were examined among those who reported usually visiting the dentist for a 'Problem/pain' or 'Other' reason.

There was a significant difference between the two groups in relation to the normative referent 'partner'. Compared to 'Problem/pain' attenders, 'Other' attenders reported a significantly higher mean score in relation to the perceived level of approval to visit the dentist by their partner. In each attender group however, mean normative belief strength scores for each normative referent indicated that respondents felt that each of these referents would strongly approve of them visiting the dentist (as indicated by mean scores being well above the midpoint of 0, with mean scores ranging from 1.8–2.2 for 'Problem/pain' attenders and 1.80–2.5 for 'Other' attenders).

Table 5.47: Normative belief strength by self-reported usual reason for visiting the dentist: means and standard deviations

Normative referent	Problem/pain *n*	Problem/pain Mean	Problem/pain SD	Other *n*	Other Mean	Other SD	
	Usual reason for visiting the dentist						
Family	315	2.213	1.242	166	2.349	1.100	
Partner	242	2.140	1.313	123	2.463	1.066	*
Parent/s	179	1.838	1.387	80	1.938	1.315	
Mother	170	1.888	1.374	80	1.975	1.312	
Friend/s	282	1.837	1.353	149	1.805	1.314	

Note. Normative belief strength scored from –3 to +3
*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

As presented in Table 5.48, each attender group did not differ significantly with regards to their motivation to comply with each of the normative referents. Respondents in each group were generally motivated to comply with family and partner (as indicated by mean scores greater than the midpoint of 4) but less motivated to comply with the wishes of their mother and friend/s (as indicated by mean scores falling below the midpoint of 4). Although not significantly different, 'Problem/pain' attenders were less inclined to comply with the wishes of their parent/s (the mean score for this group was just below the midpoint of 4) whereas the 'Other' attender group indicated that they were slightly more motivated to comply with the wishes of their parent/s (the mean score for this group was greater than the midpoint of 4).

Table 5.48: Motivation to comply by self-reported usual reason for visiting the dentist: means and standard deviations

Normative referent	Problem/pain *n*	Problem/pain Mean	Problem/pain SD	Other *n*	Other Mean	Other SD	
	Usual reason for visiting the dentist						
Family	315	4.406	2.376	162	4.407	2.302	ns
Partner	240	4.833	2.317	122	5.123	2.338	ns
Parent/s	178	3.764	2.370	80	4.025	2.187	ns
Mother	172	3.942	2.432	78	3.974	2.198	ns
Friend/s	280	3.718	2.431	147	3.932	2.220	ns

Note. Motivation to comply scored from +1 to +7
ns not statistically significant

Examination of mean product scores for each normative referent by attender group revealed that, overall, participants in each group generally perceived reasonably strong positive social pressure from these referents to visit the dentist, with mean product scores ranging from 8.4–13.8 (see Table 5.49). 'Problem/pain' attenders, however, perceived a lower level of pressure to visit the dentist from their partner when compared to 'Other' attenders. Nonetheless this normative referent was considered by both groups to have the greatest influence on them visiting the dentist, followed by family members.

Table 5.49: Product score (i.e., nb_jmc_j) by self-reported usual reason for visiting the dentist: means and standard deviations

	Usual reason for visiting the dentist						
	Problem/pain			Other			
Normative referent	*n*	Mean nb_jmc_j	SD	*n*	Mean nb_jmc_j	SD	
Family	312	10.590	8.546	163	11.485	8.018	
Partner	239	11.406	9.213	121	13.777	8.408	*
Parent/s	176	8.057	8.423	79	9.468	7.993	
Mother	169	8.657	8.681	79	9.342	8.029	
Friend/s	279	8.054	8.389	146	8.370	7.893	

nb_jmc_j = Normative belief strength for referent j x motivation to comply with referent j (j=1...5), range=–21 to +21
* ($P<0.05$); ANOVA

Control beliefs

Control belief strength and control power were examined among those who reported usually visiting the dentist for a 'Problem/pain' or 'Other' reason.

Table 5.50 presents the distribution of control belief strength scores for each perceived control factor by self-reported usual reason for visiting the dentist. The first point to note is the direction of the mean scores assessing control belief strength. For each attender group, each control factor was perceived as a barrier to dental care, as mean scores fell below the midpoint of 0. Significant differences in mean scores between the groups related to beliefs about long waiting lists, having bad dental experiences, being afraid about the dental visit and being anxious about the dental visit. 'Problem/pain' attenders reported significantly lower mean scores on each of these control factors indicating that they perceived these factors as being a barrier to dental care more so than what 'Other' attenders did. The two lowest mean scores obtained for each group related to costly dental treatment and long waiting lists, indicating that the cost of dental treatment and the length of the dental care waiting lists, as perceived by respondents, acted as obstacles to dental visiting.

Table 5.50: Control belief strength by self-reported usual reason for visiting the dentist: means and standard deviations

	Usual reason for visiting the dentist						
	Problem/pain			Other			
Control factor	*n*	Mean	SD	*n*	Mean	SD	
Long waiting lists	332	-1.831	1.249	177	-1.599	1.169	*
Costly dental treatment	333	-2.354	1.133	177	-2.328	0.926	
Having to pay a gap, i.e., co-payments	331	-1.447	1.373	174	-1.362	1.291	
Bad dental experience¥	154	-1.286	1.408	70	-0.700	1.255	**
Not having choice of dentist	332	-0.611	1.502	176	-0.574	1.307	
Being afraid about the dental visit¥	128	-1.453	1.107	68	-0.868	1.145	***
Being anxious about the dental visit¥	148	-1.324	1.120	71	-0.831	1.134	**
Convenient location of dental clinic†	331	-0.082	1.783	178	-0.303	1.740	
Having to pay for dental treatment, regardless of the amount	332	-2.223	1.090	177	-2.090	1.130	

Note. Control belief strength scored from –3 to +3 (extremely difficult to extremely easy)

¥ these items were only asked of people who responded 'Yes' to having had a bad dental experience in the past, being dentally anxious and/or being dentally afraid

† item corrected for direction of response

*** (P<0.0001), ** (P<0.01), * (P<0.05); ANOVA

Table 5.51 presents mean scores of the perceived likelihood that the control factor would be present if the respondent was to visit the dentist by self-reported usual reason for visiting the dentist. Mean scores did not differ significantly between the two groups. The highest mean score obtained for each group related to the expectation of there being long waiting lists. This indicated that respondents in each group strongly agreed that they expected there to be long dental care waiting lists if they were to visit the dentist. 'Problem/pain' attenders reported a higher mean score relating to the expectation that dental treatment would be costly compared to 'Other' attenders. (1.06 cf. 0.67). Respondents in both groups however did not expect to have a bad dental experience, be afraid and/or anxious about the dental visit, or find the dental clinic inconveniently located.

Table 5.51: Control power by self-reported usual reason for visiting the dentist: means and standard deviations

Control factor	Usual reason for visiting the dentist						
	Problem/pain			Other			
If I were to visit the dentist I expect...	*n*	Mean	SD	*n*	Mean	SD	
Long waiting lists	324	1.611	1.891	171	1.696	1.806	ns
Costly dental treatment	324	1.062	2.211	173	0.671	2.205	a
Having to pay a gap, i.e., co-payments	323	1.288	2.005	173	1.405	1.858	ns
Bad dental experience	324	-0.824	1.923	172	-1.047	1.740	ns
Not having choice of dentist	327	0.823	2.020	174	1.121	1.966	ns
Being afraid about the dental visit	327	-0.535	2.187	172	-0.802	2.039	ns
Being anxious about the dental visit	326	-0.012	2.216	174	-0.328	2.021	ns
Inconvenient location of dental clinic	325	-0.557	2.028	174	-0.718	2.025	ns

Note. Control power scored from –3 to +3 (strongly disagree to strongly agree)
a borderline significance, P=0.061
ns not statistically significant

Examination of mean product scores for each control factor by attender group revealed that there were significant differences between the two groups in relation to perceptions about costly dental treatment, being afraid about visiting the dentist and being anxious about visiting the dentist. 'Problem/pain' attenders reported feeling less in control when it came to these particular control factors compared to 'Other' attenders. Based on the negative mean product scores for all bar one control factor, namely location of the dental clinic, respondents in each group viewed each of these control factors as a barrier to dental visiting. 'Problem/pain' attenders tended to have lower mean scores than 'Other' attenders indicating that they expressed lower levels of control with regards to these factors.

Table 5.52: **Product score (i.e., $c_k p_k$) by self-reported usual reason for visiting the dentist: means and standard deviations**

Control factor	**Usual reason for visiting the dentist**						
	Problem/pain			**Other**			
If I were to visit the dentist I expect...	***n***	**Mean $c_k p_k$**	**SD**	***n***	**Mean $c_k p_k$**	**SD**	
Long waiting lists	326	-3.267	4.900	172	-3.023	4.308	
Costly dental treatment	323	-3.105	5.904	173	-1.630	5.748	**
Having to pay a gap, i.e., co-payments	323	-1.771	4.736	169	-1.402	4.362	
Bad dental experience¥	188	-0.782	3.690	94	-0.170	2.098	
Not having choice of dentist	328	-0.430	3.850	175	-0.549	3.503	
Being afraid about the dental visit¥	158	-2.006	3.413	81	-1.062	2.968	*
Being anxious about the dental visit¥	181	-2.094	3.323	86	-1.151	2.694	*
Inconvenient location of dental clinic	325	1.062	4.131	174	1.017	4.105	

$c_k p_k$ = Control belief strength for factor k x control power for factor k (k=1...8), range=–9 to +9
¥ represents only those people who responded 'Yes' to having had a bad dental experience in the past, being dentally anxious and/or being dentally afraid
** (P<0.01), * (P<0.05); ANOVA
ns not statistically significant

5.7.8.2 Actual dental attendance behaviour post-questionnaire

The first questionnaire mailout occurred in June 2003 and responses to the questionnaire were received in the time period between mid-June 2003 and beginning-December 2003. As previously discussed in Section 5.5.4.1, in the questionnaire a measure of behavioural intention was obtained by asking respondents to indicate their level of disagreement or agreement to the statements 'I want to visit the dentist' and 'I plan to visit the dentist'. The response categories were strongly disagree (=1) to strongly agree (=7). Several months later, information on dental attendance was extracted from the EXACT MIS database maintained and managed by SADS. Data were extracted for the time period 1 January 2003 to 31 August 2004. This seemed to allow sufficient time to track participant's dental visiting behaviour after the questionnaire was returned and this also ensured that the measure of behaviour obtained closely corresponded to the participant's intention toward visiting the dentist as reported in the questionnaire (i.e., longer time intervals allow more opportunities for the behaviour to be performed, increasing the intention-behaviour correspondence (Sutton (1998)). Actual dental attendance behaviour was defined by the nature of the first CoC following the return of the questionnaire. The nature of the first CoC was defined as either an Emergency CoC or a General CoC.

For those participants who returned the questionnaire, Table 5.53 details the proportion of persons who actually visited the dentist at some point after completing the questionnaire. Some 35.4% of questionnaire respondents made a dental visit after completing the questionnaire. Of those that visited, 62.8% received an emergency CoC at the first visit while 37.2% received a general CoC at the first visit after the questionnaire was returned.

Table 5.53: Attendance type among the baseline sample after returning the questionnaire

Visited after questionnaire returned	% *n*=517
Yes	35.4
No	64.6

Nature of first visit (i.e., CoC received)	% *n*=183
Emergency	62.8
General	37.2

Table 5.54 details the period in which questionnaire respondents were followed after the questionnaire was returned. Overall, questionnaire respondents were followed for an average of 14.05 months (or 1.17 years). The follow-up period varied significantly between those who did and those who did not make a dental visit after returning the questionnaire, with those who made a visit after returning the questionnaire followed for an average time of 14.18 months (or 1.18 years), compared to a slightly shorter period of 13.98 months (or 1.17 years) for those who did not visit after returning the questionnaire.

Table 5.54: Follow-up period in months from questionnaire date to 31 August 2004

		Follow-up period (months)			
Made visit*	*n*	Min	Max	Mean	SD
Yes	183	11.047	18.608	14.184	0.677
No	334	9.008	14.663	13.979	0.861
Total	517	9.008	18.608	14.052	0.806

* (P=0.005); ANOVA

Table 5.55: Follow-up period in years from questionnaire date to 31 August 2004

		Follow-up period (years)			
Made visit*	*n*	Min	Max	Mean	SD
Yes	183	0.921	1.551	1.182	0.056
No	334	0.751	1.222	1.165	0.072
Total	517	0.751	1.551	1.171	0.067

* (P=0.005); ANOVA

The pattern of care received during the follow-up period for those who visited after returning the questionnaire is presented in Table 5.56. Emergency dental care dominates the type of care sought by those who visited, with 52.5% of those who visited receiving emergency care only, 30.1% receiving general care only and 17.5% receiving both emergency and general care at their subsequent dental visits. Although a pattern of dental attendance was collected post-questionnaire, the nature of the first visit post-questionnaire was used as the actual dental behaviour measure employed in the prediction of behaviour as this measure was in closer temporal proximity to the measure of intention.

Table 5.56: Pattern of CoC type received by those who visited after returning the questionnaire

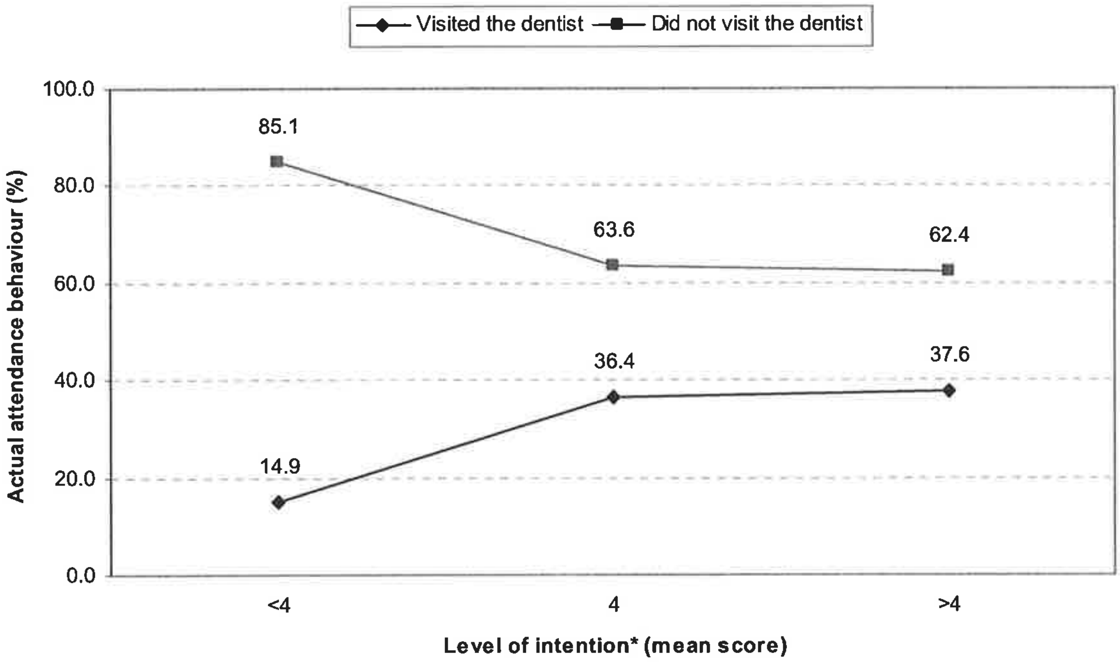
Visited after questionnaire returned	% *n*=517
Yes	35.4
No	64.6

Pattern of CoC type received†	% *n*=183
Emergency	52.5
General	30.1
Emergency and General	17.5

† from the date the questionnaire was returned to 31 August 2004

Intentions and actual attendance behaviour

Figure 5.12 illustrates the relationship between dental visiting intentions and actual dental attendance behaviour post-questionnaire. A smaller proportion of persons attended if they said that they did not intend to visit the dentist and a greater proportion attended if they said that they did intend to visit the dentist. For example, of those respondents who disagreed with the two intention statements (i.e., mean intention score <4), 15% subsequently made a dental visit, compared with 37.6% of those who agreed with the two intention statements (i.e., mean intention score >4).



* Actual attendance behaviour x level of intention: ($P<0.01$); χ^2 test

Figure 5.12: Relationship between dental visiting intentions and actual dental attendance behaviour post-questionnaire

The relationship between intentions and the first type of CoC received for those who visited the dentist post-questionnaire is shown in Figure 5.13. Of those who did not intend to visit the dentist, 85.7% ended up visiting the dentist for an emergency CoC as their first CoC post-questionnaire, while the remaining 14.3% first visited for a general CoC. Perhaps non-intenders receiving a general CoC were on a waiting list for general care and did not expect that they would be offered a general CoC at the time they filled in the questionnaire, and hence did not intend to visit the dentist. Of those who reported that they did intend to visit the dentist, 58.9% first visited for an emergency CoC after returning the questionnaire, while the remaining 41.1% first visited for a general CoC post-questionnaire.

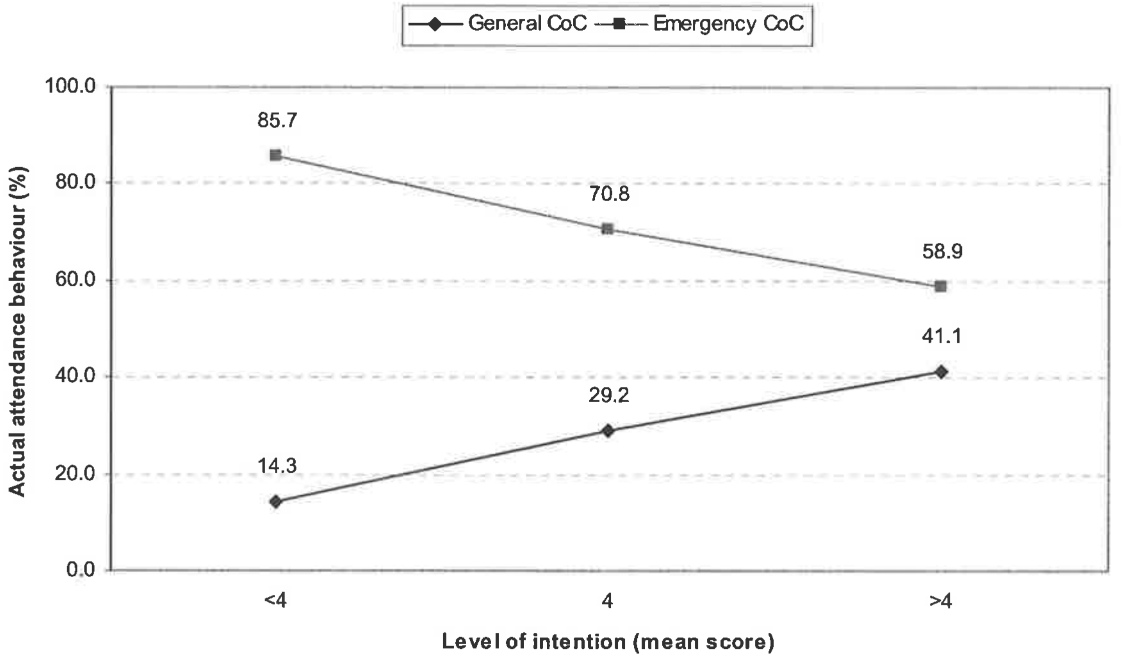
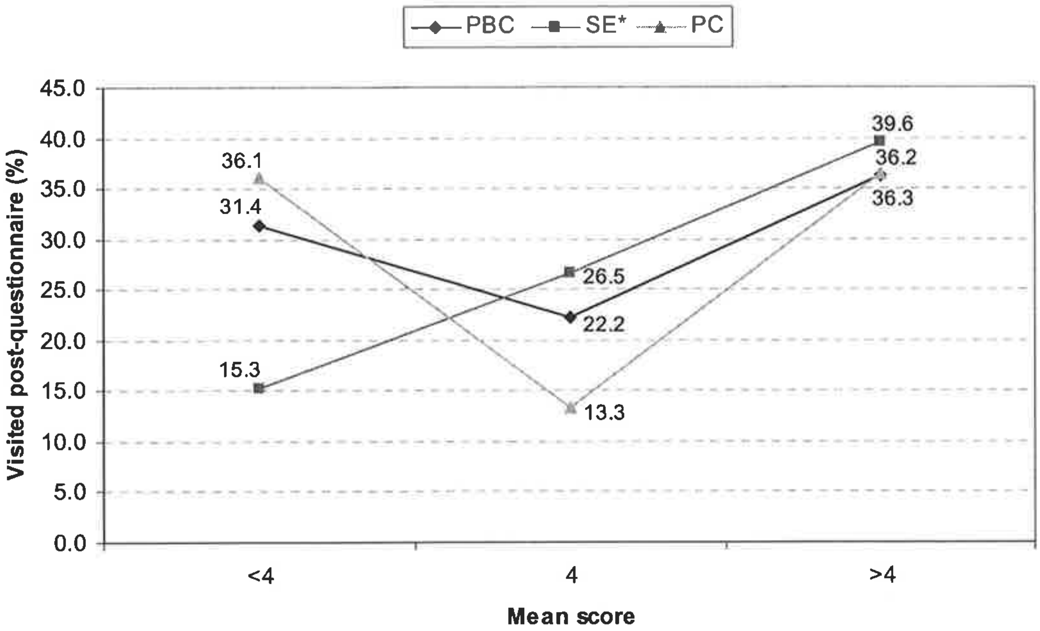


Figure 5.13: **Relationship between intentions and initial type of dental attendance for those who visited the dentist post-questionnaire**

Perceived behavioural control and actual attendance behaviour

Examination of the relationship between perceived behavioural control (broken down into self-efficacy and perceived control components) and actual dental attendance behaviour post-questionnaire (see Figure 5.14) revealed that only 31.4% of those who reported a perceived lack of control in relation to visiting the dentist actually visited the dentist post-questionnaire compared to 36.2% who reported being in control of their dental visiting behaviour. Some 22.1% of respondents who responded impartially with regards to their perceptions of the control they had over visiting the dentist actually visited the dentist post-questionnaire.

The relationship between self-efficacy and actual dental attendance behaviour post-questionnaire was very linear with a significantly smaller proportion of persons who reported a lack of self-efficacy attending and a greater proportion of persons who reported strong self-efficacy beliefs attending. Similar proportions of persons who perceived to not be in control over their dental visiting (36.1%) and those who did perceive to be in control over their dental visiting (36.2%) attended the dentist post-questionnaire.



* Actual attendance behaviour x level of self-efficacy: (P<0.01); χ^2 test

Figure 5.14: Relationship between perceived behavioural control (broken down into self-efficacy and perceived control) and actual dental attendance behaviour post-questionnaire

Global measures by actual attendance behaviour

Bivariate associations between actual dental attendance behaviour post-questionnaire and direct measures of intentions, attitudes, subjective norms and perceived behavioural control were examined. Table 5.57 summarises these results for those who received an emergency CoC or general CoC as their first CoC post-questionnaire. There were no significant differences in mean scores on each of the cognitive measures between the two groups. Those who first attended for an emergency CoC or general CoC after returning the questionnaire reported strong positive intentions, attitudes, subjective norms and perceptions of control toward visiting the dentist.

Table 5.57: Intentions, attitudes, subjective norms, and perceived behavioural control by actual dental attendance behaviour: means and standard deviations

	Actual dental attendance behaviour						
	Emergency			General			
Variable	*n*	Mean	SD	*n*	Mean	SD	
Intentions (I)	109	5.725	1.444	68	6.015	1.143	ns
Attitudes (ATT)	113	6.469	0.568	68	6.463	0.594	ns
Subjective norms (SN)	113	5.923	1.278	68	5.794	1.337	ns
Perceived behavioural control (PBC)	114	5.970	1.261	67	5.785	1.315	ns
- Self-efficacy (SE)	114	5.588	1.257	67	5.567	1.190	ns
- Perceived control (PC)	114	6.225	1.581	67	5.930	1.786	ns

ns not significant

Belief-based measures by actual attendance behaviour

Bivariate associations between actual dental attendance behaviour post-questionnaire and indirect measures of attitudes, subjective norms and perceived behavioural control (disaggregated into self-efficacy and perceived control) were also examined. These results are summarised in Table 5.58. In each attender groups, positive mean scores were obtained for attitudes and subjective norms, indicating that respondents in each group held favourable attitudes towards visiting the dentist and experienced some level of social pressure to visit the dentist. However, negative mean scores obtained for the perceived behavioural control construct indicated that respondents in both groups did not feel in control over visiting the dentist, both in terms of self-efficacy concerns and perceptions of control. Emergency attenders tended to have lower mean scores across all the cognitive constructs.

Table 5.58: Belief-based measures of attitude, subjective norm, and perceived behavioural control by self-reported usual reason for visiting the dentist: means and standard deviations

	Actual dental attendance behaviour						
	Emergency			General			
Variable	*n*	Mean	SD	*n*	Mean	SD	
Attitude[a] (Att)	114	66.684	41.082	68	72.941	46.058	
Subjective norm[b] (Sn)	110	35.036	32.451	67	37.657	29.565	
Perceived behavioural control[c] (Pbc)	113	-8.274	16.733	68	-5.735	14.755	
- Self-efficacy[d] (Se)	70	-3.314	7.276	56	-1.304	4.451	d
- Perceived control[e] (Pc)	112	-6.277	14.756	68	-4.662	14.122	

a Minimum score=–162, Maximum=+162
b Minimum score=–105, Maximum=+105
c Minimum score=–72, Maximum=+72, d Minimum score=–27, Maximum=+27, e Minimum score=–45, Maximum=+45
d borderline significance, P=0.072

Behavioural beliefs

Behavioural belief strength and outcome evaluations were examined among those whose actual attendance behaviour post-questionnaire (based on the nature of their first CoC after returning the questionnaire) was classified as either an Emergency or General attender.

Table 5.59 presents mean belief strength scores for each perceived outcome of dental visiting by actual dental attendance behaviour post-baseline. Significant differences in mean scores between the two groups were found for two of the outcome beliefs about visiting the dentist, namely having one's teeth cleaned and prevention of tooth loss. In comparison to General attenders, Emergency attenders reported significantly lower mean scores on these two beliefs, indicating that their beliefs about the likelihood of these two outcomes occurring as a result of visiting the dentist were not as strong as General attenders. Similarly for the beliefs about receiving preventive treatments and receiving dental advice from a dental professional, whereby Emergency attenders reported lower mean scores compared to General attenders. The differences in mean scores between these two groups for these two beliefs were of borderline statistical significance. Generally both groups held favourable beliefs about the outcomes of visiting the dentist. Each group believed that each of the positive outcomes listed in Table 5.59, were a likely outcome of visiting the dentist (as indicated by mean scores being above the midpoint of 0). Emergency and General attenders, however, indicated that they thought they would have to wait a long time in the waiting room for their designated appointment (as indicated by mean scores falling below the midpoint of 0).

Table 5.59: Belief strength by actual dental attendance behaviour: means and standard deviations

Outcome (*I think that by visiting the dentist I will...*)	Emergency *n*	Emergency Mean	Emergency SD	General *n*	General Mean	General SD	
	Actual dental attendance behaviour						
Prevent tooth decay	113	1.478	1.788	67	1.522	1.541	
Keep teeth healthy	112	2.036	1.301	67	2.030	1.128	
Prevent future problems with teeth, mouth or dentures	113	1.938	1.416	64	2.000	1.403	
Keep teeth looking good	113	1.779	1.504	68	1.897	1.248	
Prevent pain in teeth, mouth or dentures	113	2.097	1.217	67	1.940	1.254	
Have good oral health	113	2.018	1.239	68	2.103	1.108	
Receive preventive treatments	113	1.478	1.847	66	1.955	1.059	a
Have teeth cleaned	112	0.920	2.097	68	1.838	1.399	**
Receive fillings to fix dental decay	113	1.929	1.419	67	2.060	1.336	
Receive unnecessary extractions†	111	1.450	1.953	67	1.507	1.949	
Prevent loss of teeth	111	1.072	2.088	67	1.716	1.277	*
Receive dental advice from a dental professional	113	1.973	1.417	67	2.313	0.783	b
Get dental problems fixed if there were any problems to be fixed	113	2.177	1.120	67	2.343	0.863	
Have to wait a long time in the waiting room for the appointment†	113	-0.381	1.779	67	-0.358	1.815	
Experience painful dental treatment†	113	0.239	1.872	68	0.456	1.643	
Seen promptly	113	0.425	1.782	67	0.507	1.804	
Afraid about the dental visit†	113	0.832	2.065	68	0.618	1.853	
Anxious about the dental visit†	113	0.549	2.155	68	0.147	1.957	

† item corrected for direction of response
Note. Behavioural belief strength scored from –3 to +3
** (P<0.01), * (P<0.05); ANOVA
a borderline significance P=0.057
b borderline significance P=0.073
ns not statistically significant

Table 5.60 presents mean outcome evaluation scores for each perceived outcome of visiting the dentist by actual dental attendance behaviour post-baseline. There were no significant differences in mean scores between the two groups in terms of the value each group attached to each outcome. Each group appeared to value all these consequences of visiting the dentist quite positively.

Table 5.60: Outcome evaluation by actual dental attendance behaviour: means and standard deviations

Outcome (*I think that by visiting the dentist I will...*)	Actual dental attendance behaviour: Emergency *n*	Mean	SD	General *n*	Mean	SD	
Prevent tooth decay[a]	113	2.602	1.022	68	2.426	1.418	ns
Keep teeth healthy[a]	113	2.619	0.967	68	2.544	1.251	ns
Prevent future problems with teeth, mouth or dentures[a]	112	2.643	0.976	68	2.574	1.150	ns
Keep teeth looking good[a]	112	2.491	1.013	68	2.412	1.149	ns
Prevent pain in teeth, mouth or dentures[a]	113	2.637	1.027	68	2.662	1.060	ns
Have good oral health[a]	113	2.628	0.993	68	2.603	1.024	ns
Receive preventive treatments[a]	113	2.451	1.061	68	2.500	1.044	ns
Have teeth cleaned[a]	111	2.180	1.055	68	2.279	1.104	ns
Receive fillings to fix dental decay[a]	113	2.655	0.961	68	2.662	0.956	ns
Receive unnecessary extractions[†b]	113	2.681	1.037	68	2.632	1.091	ns
Prevent loss of teeth[a]	113	2.345	1.033	68	2.353	1.143	ns
Receive dental advice from a dental professional[a]	113	2.673	1.013	68	2.647	1.048	ns
Get dental problems fixed if there were any problems to be fixed[a]	113	2.097	1.069	68	1.882	1.127	ns
Have to wait a long time in the waiting room for the appointment[†b]	112	2.607	1.060	68	2.574	1.012	ns
Experience painful dental treatment[†b]	113	2.195	1.224	68	2.191	1.110	ns
Seen promptly[a]	113	1.522	1.111	68	1.412	1.068	ns
Afraid about the dental visit[†b]	112	1.429	1.320	68	1.132	1.303	ns
Anxious about the dental visit[†b]	111	1.225	1.469	68	1.000	1.349	ns

† item corrected for direction of response
a Outcome evaluation scored from –3 to +3 (extremely unimportant to extremely important)
b Outcome evaluation scored from –3 to +3 (extremely bad to extremely good)
ns not statistically significant

Examination of mean product scores for each outcome of visiting the dentist by attender group revealed a significant difference between the two groups in relation to having their teeth cleaned. Although positive, Emergency attenders reported a lower mean score for this item than General attenders. Overall, both groups perceived that each of the outcomes of dental visiting encouraged dental attendance, thus contributing to positive attitudes towards dental visiting (mean scores above 0). However, both Emergency and General attenders indicated that having to wait a long time in the waiting room for their designated appointment would discourage dental attendance, thus contributing to negative attitudes toward dental visiting (mean scores below 0) (see Table 5.61).

Table 5.61: Product score (i.e., b_ie_i) by actual dental attendance behaviour: means and standard deviations

	Actual dental attendance behaviour					
	Emergency			General		
Outcome *(I think that by visiting the dentist I will...)*	*n*	Mean b_ie_i	SD	*n*	Mean b_ie_i	SD
Prevent tooth decay[a]	113	4.195	5.085	67	4.164	4.708
Keep teeth healthy[a]	111	5.595	4.026	67	5.269	4.301
Prevent future problems with teeth, mouth or dentures[a]	111	5.414	4.183	64	5.281	4.589
Keep teeth looking good[a]	111	4.775	4.280	68	4.897	3.868
Prevent pain in teeth, mouth or dentures[a]	113	5.796	3.742	67	5.209	4.176
Have good oral health[a]	113	5.575	3.722	68	5.706	3.906
Receive preventive treatments[a]	112	3.866	5.182	66	5.030	3.642
Have teeth cleaned[a]	109	2.349	5.343	68	4.309	4.466 *
Receive fillings to fix dental decay[a]	112	5.402	4.244	67	5.388	4.549
Receive unnecessary extractions[†b]	110	3.655	6.031	67	4.552	5.358
Prevent loss of teeth[a]	110	3.036	5.246	67	4.060	4.048
Receive dental advice from a dental professional[a]	112	5.357	4.620	67	6.194	3.465
Get dental problems fixed if there were any problems to be fixed[a]	112	4.598	3.499	67	4.493	3.386
Have to wait a long time in the waiting room for the appointment[†b]	112	-1.080	5.030	67	-0.866	5.137
Experience painful dental treatment[†b]	113	0.646	4.588	68	1.324	4.255
Seen promptly[a]	114	0.316	3.406	67	0.463	3.496
Afraid about the dental visit[†b]	111	0.838	4.641	68	0.912	3.780
Anxious about the dental visit[†b]	111	0.432	4.738	68	0.265	3.643

† item corrected for direction of response
b_ie_i = Behavioural belief strength for outcome i x outcome evaluation for outcome i (i=1...18), range=–9 to +9
* (P<0.05); ANOVA

Normative beliefs

Normative belief strength and motivation to comply with normative referents were examined among those whose actual attendance behaviour post-questionnaire was classified as either an Emergency or General attender.

Table 5.62 presents mean belief strength scores for each normative referent by actual dental attendance behaviour post-baseline. Mean normative belief strength scores did not differ significantly between Emergency and General attenders. Mean scores in each group were well above the midpoint of 0, indicating positive support from each of the normative referents. For respondents in each group, reasonably strong approval to visit the dentist was seen to stem from each normative referent. Family and partner were perceived as being more strongly in support of them visiting the dentist.

Table 5.62: Normative belief strength by actual dental attendance behaviour: means and standard deviations

	Actual dental attendance behaviour						
	Emergency			General			
Normative referent	*n*	Mean	SD	*n*	Mean	SD	
Family	106	2.406	1.177	65	2.231	1.235	ns
Partner	80	2.175	1.448	51	2.412	1.004	ns
Parent/s	50	2.160	1.315	30	1.833	1.262	ns
Mother	46	2.109	1.354	31	1.839	1.241	ns
Friend/s	95	2.021	1.329	60	1.950	1.227	ns

Note. Normative belief strength scored from −3 to +3
ns not statistically significant

Mean scores representing motivation to comply by actual dental attendance post-questionnaire are presented in Table 5.63. A mean score above the scale midpoint of 4 indicated that respondents were motivated to comply with the wishes of those who were important to them, whereas a score below the scale midpoint of 4 indicated the opposite. Emergency and General attenders indicated that they were, at varying levels, motivated to comply with the expectations of their partner and family but not so much with their parent/s or friend/s. General attenders expressed a significantly greater desire to comply with their partner than did Emergency attenders.

General attenders indicated that that they were less motivated to comply with the wishes of their mother, whereas Emergency attenders remained impartial with regards to this referent.

Table 5.63: Motivation to comply by actual dental attendance behaviour: means and standard deviations

	Actual dental attendance behaviour						
	Emergency			General			
Normative referent	*n*	Mean	SD	*n*	Mean	SD	
Family	104	4.500	2.457	64	4.531	2.370	ns
Partner	79	4.671	2.500	51	5.510	1.984	*
Parent/s	49	3.980	2.626	31	3.677	2.315	ns
Mother	47	4.021	2.633	32	3.656	2.336	ns
Friend/s	94	3.989	2.349	60	3.983	2.418	ns

Note. Motivation to comply scored from +1 to +7
* ($P<0.05$); ANOVA
ns not statistically significant

Table 5.64 presents mean product scores for each normative referent by actual dental attendance behaviour post-questionnaire. Mean product scores for Emergency and

General attenders ranged from 9.33–11.23 and 8.29–14.43 respectively. The range of scores in each group indicated that respondents perceived reasonably strong positive social pressure from these referents to visit the dentist.

Compared to General attenders, Emergency attenders perceived significantly lower levels of pressure to visit the dentist from their partner. However, perceived pressure to visit the dentist stemming from this referent was still moderately strong for both groups.

Table 5.64: Product score (i.e., nb_jmc_j) by actual dental attendance behaviour: means and standard deviations

	Actual dental attendance behaviour						
	Emergency			General			
Normative referent	*n*	Mean nb_jmc_j	SD	*n*	Mean nb_jmc_j	SD	
Family	103	11.233	8.958	65	11.369	8.038	
Partner	79	10.835	10.077	51	14.431	7.796	*
Parent/s	49	10.265	9.101	30	8.400	7.591	
Mother	46	10.217	9.218	31	8.290	7.564	
Friend/s	93	9.333	8.297	60	8.983	7.933	

nb_jmc_j = Normative belief strength for referent j x motivation to comply with referent j (j=1...5), range=–21 to +21
* (P<0.05); ANOVA

Control beliefs

Control belief strength and control power were examined among those whose actual attendance behaviour post-questionnaire was classified as either an Emergency or General attender.

Table 5.65 presents the distribution of control belief strength scores for each control factor identified by actual dental attendance behaviour. For each attender group, mean control belief strength scores were negative (i.e., below the midpoint of zero) indicating that both Emergency and General attenders perceived each of these nine control factors as a barrier to visiting the dentist. Perceptions about costly dental treatment, long waiting lists, co-payments and having to pay for treatment regardless of the amount were among the most strongly held beliefs, with both groups reporting the lowest scores, on average, for these four control factors. Emergency and General attenders alike believed that these four factors would make visiting the dentist rather difficult. Regarding differences between the two groups, Emergency attenders reported being significantly more afraid about visiting the dentist than General attenders.

Table 5.65: Control belief strength by actual dental attendance behaviour: means and standard deviations

	Actual dental attendance behaviour						
	Emergency			General			
Control factor	*n*	Mean	SD	*n*	Mean	SD	
Long waiting lists	113	-1.805	1.141	68	-1.765	1.294	
Costly dental treatment	113	-2.336	1.066	68	-2.294	1.080	
Having to pay a gap, i.e., co-payments	113	-1.354	1.433	66	-1.348	1.318	
Bad dental experience¥	48	-0.813	1.620	29	-0.966	1.149	
Not having choice of dentist	113	-0.619	1.566	67	-0.433	1.395	
Being afraid about the dental visit¥	31	-1.581	1.148	35	-0.771	1.165	**
Being anxious about the dental visit¥	40	-1.025	1.527	36	-0.806	0.980	
Convenient location of dental clinic†	113	-0.168	1.885	67	-0.343	1.788	
Having to pay for dental treatment, regardless of the amount	113	-2.124	1.174	68	-2.235	1.067	

Note. Control belief strength scored from –3 to +3 (extremely difficult to extremely easy)

¥ these items were only asked of people who responded 'Yes' to having had a bad dental experience in the past, being dentally anxious and/or being dentally afraid

† item corrected for direction of response

** (P<0.01); ANOVA

ns not statistically significant

Table 5.66 displays the mean scores representing the perceived likelihood of the presence of these control factors if the respondent was to make a dental visit by actual dental attendance behaviour. Expectations about there being long waiting lists significantly differed between the two groups. General attenders more strongly agreed that they expected there to be long waiting lists than Emergency attenders did. Nonetheless respondents in each group anticipated the presence of this factor, along with co-payments, costly dental treatment and not being able to choose the dentist who treats them. Respondents in each group however did not expect to have a bad dental experience, be afraid or anxious and find the dental clinic inconveniently located.

Table 5.66: Control power by actual dental attendance behaviour: means and standard deviations

Control factor	Actual dental attendance behaviour						
	Emergency			General			
If I were to visit the dentist I expect...	*n*	Mean	SD	*n*	Mean	SD	
Long waiting lists	107	1.589	2.101	68	2.162	1.421	*
Costly dental treatment	109	0.771	2.284	65	0.692	2.397	
Having to pay a gap, i.e., co-payments	108	1.463	2.075	66	1.303	1.961	
Bad dental experience	108	-1.148	1.884	68	-0.941	1.954	
Not having choice of dentist	110	1.055	1.891	68	0.956	2.202	
Being afraid about the dental visit	109	-0.862	2.184	68	-0.382	2.151	
Being anxious about the dental visit	108	-0.148	2.254	67	0.269	2.178	
Inconvenient location of dental clinic	108	-0.454	2.102	67	-0.433	2.098	

Note. Control power scored from –3 to +3 (strongly disagree to strongly agree)
* (P<0.05); ANOVA
ns not statistically significant

Mean product scores for each control factor by actual attendance behaviour were not significantly different. Emergency and General attenders believed that the majority of these factors would hinder their control regarding visiting the dentist (see Table 5.67).

Table 5.67: Product score (i.e., $c_k p_k$) by actual dental attendance behaviour: means and standard deviations

Control factor	Actual dental attendance behaviour						
	Emergency			General			
If I were to visit the dentist I expect...	N	Mean $c_k p_k$	SD	N	Mean $c_k p_k$	SD	
Long waiting lists	108	-3.074	4.974	68	-3.662	4.547	ns
Costly dental treatment	108	-2.426	5.912	65	-1.477	6.657	ns
Having to pay a gap, i.e., co-payments	107	-1.626	4.948	64	-1.250	4.663	ns
Bad dental experience¥	56	-0.929	3.437	37	-0.243	2.743	ns
Not having choice of dentist	111	-0.495	4.072	67	0.493	3.653	ns
Being afraid about the dental visit¥	44	-1.773	3.722	37	-0.865	2.898	ns
Being anxious about the dental visit¥	53	-1.925	3.663	38	-0.842	2.488	ns
Inconvenient location of dental clinic	107	1.121	4.682	67	1.119	4.096	ns

$c_k p_k$ = Control belief strength for factor k x control power for factor k (k=1...8), range=–9 to +9
¥ represents only those people who responded 'Yes' to having had a bad dental experience in the past, being dentally anxious and/or being dentally afraid
ns not statistically significant

5.7.9 Testing the model

5.7.9.1 Model for predicting intentions

Regression assumptions

Multiple linear regression analysis was used to quantify the extent of the linear relationship between the dependent variable (direct measure of intentions) and the independent variables (direct measures of attitudes, subjective norms and perceived behavioural control). Before proceeding with this analysis, however, the general assumptions relating to the use of multiple linear regression analysis were tested. The assumptions tested were normality, linearity, homoscedasticity and independence of the residuals (Hankins, French and Horne, 2000; Coakes and Steed, 2001). Cohen and Cohen (1983) recommend analysing the residuals to assess the adequacy (or inadequacy) of the multiple regression model. Graphical tests of these assumptions are presented in Figure 5.15. The Normal P-P Plot of Regression Residuals shows whether residuals are normally distributed (i.e., random error) or whether there are more outliers than expected. If the residuals are from a normal distribution they should fall more or less on a straight line. Examination of the normal plot of regression standardised residuals for the dependent variable showed some deviations from the 45-degree line but, overall, indicated a relatively normal distribution (NOTE: The central limit theorem assumes that even when error is not normally distributed, and the sample size is large, the sampling distribution of the beta coefficient will still be normal. Consequently, violations of this assumption usually have little or no impact on substantive conclusions for large samples. When the sample size is small, however, tests of normality are important (Garson, 2002)).

The scatterplot of standardised residuals against the standardised predicted values is used to test for non-linearity, non-normal residuals and/or heteroscedasticity. From the scatterplot of the standardised residuals against predicted values, there appears to be no clear relationship between the residuals and predicted values, consistent with the assumption of linearity (as a rule of thumb, residuals should be evenly scattered/spread around the horizontal line centred at zero, and 95% of the residuals should fall between -2 and +2).

Absence of multicollinearity among the independent variables is also assumed. Based on the correlations between components of the TPB displayed in Table 5.23, this assumption does not appear to be violated. Despite the significant correlations between the cognitive measures, this method of analysis will still be used as the TPB supports a theoretical relationship between the independent variables.

Thus, the dependent variable appeared to be normally distributed at points along the regression line (i.e., the residuals appeared to be normally distributed), and the variance in the residuals did not appear to be associated with the predicted value of the dependent variable (i.e., the residuals appeared to be homoscedastic), indicating that the assumptions had not been violated and it was reasonable to proceed with this method of analysis.

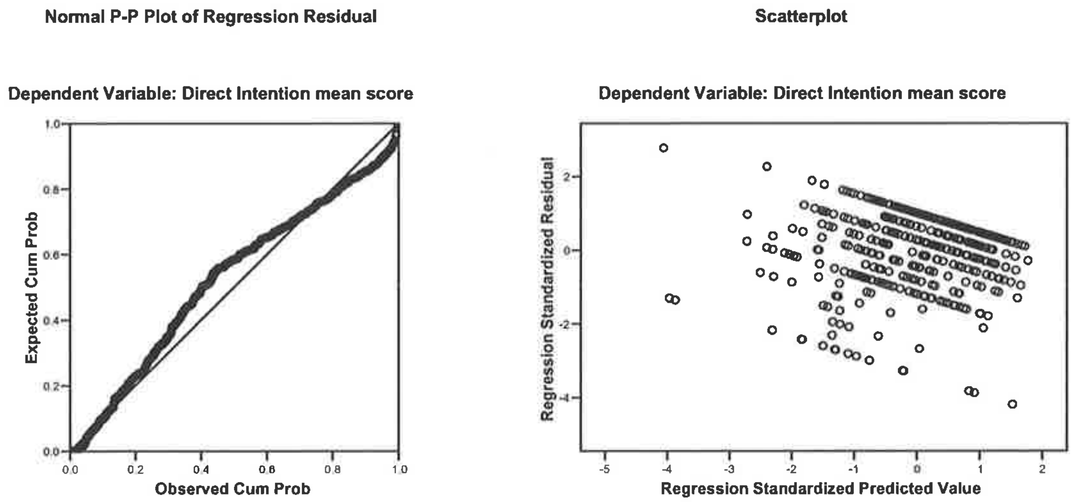


Figure 5.15: Normal probability plot and residual plot for direct measure of intention

Intentions model

In order to identify the most important predictors of intentions to visit the dentist, the TPB variables were entered into a hierarchical (sequential) regression analysis. Sex and age were entered at the first two steps, followed by the direct measures of attitudes, subjective norms, self-efficacy and perceived control at steps 3, 4, 5 and 6 respectively. Age and sex together were able to explain only 0.5% of the variance in intentions to visit the dentist (F=2.312, d.f.=489, P=0.100). The addition of the TPB variables led to a significant increase in the amount of variance explained (R^2 change=0.121, F change=16.77, P<0.0001). Together the variables under consideration were able to explain 11.9% (adjusted R^2) of the variance in intention to visit the dentist (F=12.051, d.f.=489, P<0.0001). Inspection of the beta values revealed that all four TPB variables emerged as significant independent predictors in the final regression equation, i.e., attitudes (beta=0.437, P<0.0001), subjective norms (beta=0.127, P=0.018), self efficacy (beta=0.232, P<0.0001) and perceived control (beta=-0.099, P=0.037). Public dental patients who intended to visit the dentist were therefore more likely to have positive attitudes toward visiting the dentist, were more likely to perceive positive social influences (i.e., more likely to believe that significant others would support their decision to visit the dentist) and were more likely to have confidence in their ability to visit the dentist. However, public dental patients intending to visit the dentist were less likely to believe that they have control over their dental visiting.

Examination of the semi-partial correlations in Table 5.68 indicated the relative importance of the predictors of intentions. To obtain the unique variance in intentions explained by each of the predictor variables, the semi-partial correlations were squared. These squared values indicated that attitudes explained 3.3% of variance in intentions to visit the dentist, subjective norms 1.0%, self-efficacy 2.9% and perceived control 0.8%. Based on these analyses, attitudes appeared to be the most important predictor of intentions, followed by self-efficacy concerns.

Table 5.68: Multiple linear regression analysis to predict dental visiting intentions among adult public dental patients controlling for age and sex (n=490)

						Correlations		
Model 6†	**β^a**	**SE^a**	**Beta^b**	**Sig.**	**95% CI for β**	**Partial**	**Part**	**Part^2**
(Constant)	1.527	0.686		0.026	(0.179,2.876)			
Age	-0.001	0.004	-0.009	0.840	(-0.010,0.008)	-0.009	-0.009	0.007
Sex	-0.052	0.138	-0.016	0.704	(-0.323,0.218)	-0.017	-0.016	0.026
Direct ATT mean score	0.437	0.102	0.199	0.000	(0.236,0.637)	0.191	0.182	3.299
Direct SN mean score	0.127	0.054	0.111	0.018	(0.022,0.233)	0.107	0.101	1.011
Direct SE mean score	0.232	0.057	0.198	0.000	(0.119,0.345)	0.181	0.171	2.932
Direct PC mean score	-0.099	0.047	-0.095	0.037	(-0.192,-0.006)	-0.095	-0.089	0.789

† Dependent variable: Direct intentions
F(6,483) = 12.051, P<0.0001
a unstandardised coefficients
b standardised coefficients

Table 5.69: Multiple linear regression analysis to predict dental visiting intentions: model summary

				Change statistics				
Model†	R	R^2	Adjusted R^2	R^2 change	F change	df1	df2	Sig. F change
1	0.093[a]	0.009	0.007	0.009	4.280	1.000	488.000	0.039
2	0.097[b]	0.009	0.005	0.001	0.348	1.000	487.000	0.555
3	0.298[c]	0.089	0.083	0.080	42.516	1.000	486.000	0.000
4	0.316[d]	0.100	0.092	0.011	5.714	1.000	485.000	0.017
5	0.350[e]	0.122	0.113	0.023	12.470	1.000	484.000	0.000
6	0.361[f]	0.130	0.119	0.008	4.384	1.000	483.000	0.037

a Predictors: (Constant), Age
b Predictors: (Constant), Age, Sex
c Predictors: (Constant), Age, Sex, Direct ATT mean score
d Predictors: (Constant), Age, Sex, Direct ATT mean score, Direct SN mean score
e Predictors: (Constant), Age, Sex, Direct ATT mean score, Direct SN mean score, Direct SE mean score
f Predictors: (Constant), Age, Sex, Direct ATT mean score, Direct SN mean score, Direct SE mean score, Direct PC mean score
† Dependent variable: Direct intentions

The intentions model was subsequently rerun with age and sex excluded as predictors based on their insignificant contribution in the earlier intentions model. These results are displayed in Table 5.70 and Table 5.71. As expected, the results presented in these tables remain consistent with those presented earlier. The amount of variance explained increased slightly. Together the variables under consideration (i.e., direct measures of attitudes, subjective norms, self-efficacy and perceived control) were able to explain 12.3% (adjusted R^2) of the variance in intentions to visit the dentist (F=18.101, d.f.=489, P<0.0001).

Table 5.70: Multiple linear regression analysis to predict dental visiting intentions among adult public dental patients (with the exclusion of age and sex as predictors) (n=490)

						Correlations		
Model 4†	β^a	SE^a	$Beta^b$	Sig.	95% CI for β	Partial	Part	$Part^2$
(Constant)	1.430	0.643		0.027	(0.166, 2.694)			
Direct ATT mean score	0.435	0.101	0.199	0.000	(0.236, 0.634)	0.191	0.182	3.298
Direct SN mean score	0.127	0.052	0.110	0.015	(0.025, 0.228)	0.110	0.103	1.071
Direct SE mean score	0.231	0.055	0.197	0.000	(0.122, 0.339)	0.186	0.177	3.124
Direct PC mean score	-0.101	0.047	-0.098	0.031	(-0.194, -0.009)	-0.098	-0.091	0.837

† Dependent variable: Direct intentions
$F(4,485) = 18.101$, P<0.0001
a unstandardised coefficients
b standardised coefficients

Table 5.71: Multiple linear regression analysis to predict dental visiting intentions (with the exclusion of age and sex as predictors): model summary

				Change Statistics				
Model†	R	R^2	Adjusted R^2	R^2 change	F change	df1	df2	Sig. F change
1	0.289[a]	0.084	0.082	0.084	44.491	1	488	0.000
2	0.312[b]	0.098	0.094	0.014	7.602	1	487	0.006
3	0.349[c]	0.122	0.116	0.024	13.218	1	486	0.000
4	0.360[d]	0.130	**0.123**	0.008	4.664	1	485	0.031

a Predictors: (Constant), Direct ATT mean score
b Predictors: (Constant), Direct ATT mean score, Direct SN mean score
c Predictors: (Constant), Direct ATT mean score, Direct SN mean score, Direct SE mean score
d Predictors: (Constant), Direct ATT mean score, Direct SN mean score, Direct SE mean score, Direct PC mean score
† Dependent variable: Direct intentions

Intentions model with a measure of perceived need

In order to enhance the predictive ability of the intention model, perceived need for dental treatment was added as to the model as a predictor variable. This seemed appropriate since people do not tend to visit a public dentist, especially given the long waiting lists that exist for general dental care, unless there is a perceived need. Gilbert, Duncan and Vogel (1998b) found that the addition of a variable that measured the perceived need for care enhanced the predictive ability of their dental service utilisation model. In their model, not perceiving a need was associated with a lower likelihood of seeking care.

Perceived need for a dental visit was assessed by a single question that asked: 'Do you think that you need to make a dental visit now?'. Response choices were: 'Yes', 'No' or 'Don't know'. Table 5.72 presents the distribution of questionnaire respondents according to their perceived need for a dental visit. At the time the questionnaire was conducted, 61.3% of respondents reported a perceived need for a dental visit whilst 29.2% reported not needing to make a dental visit.

Table 5.72: Distribution of respondent by perceived need for a dental visit

	Need a dental visit now?	*n*	Percent	Valid percent
Valid	Yes	317	61.3	67.7
	No	151	29.2	32.3
	Total	468	90.5	
Missing	Don't know	44	8.5	
	System missing	5	1.0	
	Total	49	9.5	
Total		517	100.0	

Associations between perceived need for a dental visit and dental visiting intentions were also examined. These results are presented in Table 5.73. Those who perceived a need for a dental visit now reported significantly stronger intentions to visit the dentist than those who did not perceive a current need to visit the dentist. The mean intentions score for those with a perceived need was 5.95 compared with 4.91 for those without a perceived need for a dental visit.

Table 5.73: Dental visiting intentions by perceived need for a dental visit: means and standard deviations

Need a dental visit now?*†	*n*	Mean	SD
Yes	308	5.951	1.234
No	147	4.908	1.852
Total	455	5.614	1.540

* (P<0.0001); ANOVA
† Bivariate correlation (Perceived need and Direct measure of intentions) = -0.28 (P<0.01)

The intentions regression model was subsequently rerun with the addition of perceived need as a potential predictor of dental visiting intentions. These results are presented in Table 5.74 and Table 5.75. Age and sex were excluded as predictors in this model on the basis of their insignificant contribution in the earlier model.

The addition of the perceived need variable led to a significant increase in the amount of variance explained (R^2 change=0.086, F change=47.916, P<0.0001). Together all the variables under consideration were able to explain 20.5% (adjusted R^2) of the variance in intentions to visit the dentist (F=23.925, d.f.=444, P<0.0001). Inspection of the beta values revealed that attitudes, subjective norms, self-efficacy and perceived need emerged as significant independent predictors in the final regression equation, i.e., attitudes (beta=0.403, P<0.0001), subjective norms (beta=0.099, P=0.049), self efficacy (beta=0.237, P<0.0001) and perceived need (beta=0.983, P<0.0001). Perceived control was not a significant predictor of intention (beta=-0.053, P=239). Public dental patients who intended to visit the dentist were therefore more likely to have positive attitudes toward visiting the dentist, perceive positive social influences, have confidence in their ability to visit the dentist and have a perceived need for a dental visit (i.e., increased intention related to greater perceived need).

Examination of the squared value of the semi-partial correlations in Table 5.74 revealed that in this model, attitudes explained 2.8% of the unique variance in intention to visit the dentist, subjective norms 0.7%, self-efficacy 3.5%, perceived control 0.3% and perceived need 8.6%. Based on these analyses, perceived need appeared to be the most important predictor of intentions to visit the dentist, followed by self-efficacy concerns and attitudes toward dental visiting.

Table 5.74: Multiple linear regression analysis to predict dental visiting intentions among adult public dental patients with the addition of perceived need as a predictor (n=490)

Model 4†	β[a]	SE[a]	Beta[b]	Sig.	95% CI for β	Correlations: Partial	Part	$Part^2$
(Constant)	0.890	0.641		0.166	(-0.370,2.150)			
Direct ATT mean score	0.403	0.102	0.184	0.000	(0.202, 0.604)	0.185	0.167	2.789
Direct SN mean score	0.099	0.050	0.089	0.049	(0.000, 0.198)	0.094	0.084	0.706
Direct SE mean score	0.237	0.054	0.212	0.000	(0.131, 0.342)	0.206	0.187	3.497
Direct PC mean score	-0.053	0.045	-0.054	0.239	(-0.142, 0.036)	-0.056	-0.050	0.250
Perceived need for a dental visit now (Yes)	0.983	0.142	0.300	0.000	(0.704, 1.262)	0.314	0.293	8.585

† Dependent variable: Direct intention
Perceived need scored 1='Yes', 0='No'
$F(5,439) = 23.925$, $P<0.0001$
a unstandardised coefficients
b standardised coefficients

Table 5.75: Multiple linear regression analysis to predict dental visiting intentions with the addition of perceived need as a predictor: model summary

Model†	R	R^2	Adjusted R^2	Change Statistics: R^2 change	F change	df1	df2	Sig. F change
1	0.358[a]	0.128	0.120	0.128	16.199	4	440	0.000
2	0.463[b]	0.214	0.205	0.086	47.916	1	439	0.000

a Predictors: (Constant), Direct Attitude mean score, Direct SN mean score, Direct SE mean score, Direct PC mean score
b Predictors: (Constant), Direct Attitude mean score, Direct SN mean score, Direct SE mean score, Direct PC mean score, Perceived need
† Dependent variable: Direct intention

Intentions model using median splits

As the direct measure of intentions had a negatively skewed distribution (i.e., most of the intention scores tended to cluster toward the upper end of the scale while increasingly fewer scores occurred toward the lower end of the scale), the intentions model was rerun using a median split for the dependent variable, intention to visit the dentist. Thus, intender type, i.e., higher intender versus lower intender, was used as the dependent variable in the regression model. Two models were examined using intender type as the dependent variable: in the first model the TPB variables were entered as continuous variables and in the second model, the TPB variables were entered as categorical variables derived using a median split.

1. Modelling intender type with continuous measures of the TPB variables

Binary logistic regression analysis to predict strength of dental visiting intentions was performed using continuous direct measures of the TPB variables as predictor variables. Perceived need was also included as a predictor variable in this model. The results of this regression analysis are shown in Table 5.76 and Table 5.77.

With the exception of the perceived control variable, all variables entered were significant predictors of intender type in the binary logistic regression model. The coefficients and odds ratios are presented in Table 5.76. The estimated odds of being in the 'higher intender' group increased by 50%, 27% and 40% when mean attitude scores, subjective norm scores and self-efficacy scores respectively increased by one. In addition, those reporting a perceived need for a dental visit were 3.3 times the odds of being in the 'higher intender' group compared to those who did not perceive a need to visit the dentist.

The amount of variance in intender type group explained by the predictor variables in the model was 22.1%. The TPB variables explained 13.7% of the variance in intender type and the addition of a measure of perceived need increased the amount of variance explained by 8.4% (see Table 5.77).

Table 5.76 Binary logistic regression analysis to predict strength of dental visiting intentions among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Direct ATT mean score	0.408	1.504	(1.072,2.112)	0.018
Direct SN mean score	0.235	1.265	(1.079,1.483)	0.004
Direct SE mean score	0.339	1.404	(1.185,1.662)	P<0.0001
Direct PC mean score	-0.004	0.996	(0.872,1.137)	0.951
Perceived need (Yes)[a]	1.191	3.290	(2.097,5.160)	P<0.0001
Constant	-6.102	0.002		P<0.0001

† Analysis used n=445 cases with complete data on all variables
a Reference category for odds ratio is 'No perceived need'
NOTE: Dependent variable: Intender type = Higher intender (1) vs. Lower intender (0)

Table 5.77: **Binary logistic regression analysis to predict strength of dental visiting intentions: model summary**

Step†	-2 Log Likelihood	Nagelkerke R^2	R^2 change
1	578.583	0.075[a]	–
2	567.448	0.107[b]	0.032
3	556.764	0.136[c]	0.029
4	556.558	0.137[d]	0.001
5	528.477	0.221[e]	0.084

a Variables entered on step 1: Attitudes
b Variables entered on step 2: Attitudes, Subjective norms
c Variables entered on step 3: Attitudes, Subjective norms, Self-efficacy
d Variables entered on step 4: Attitudes, Subjective norms, Self-efficacy, Perceived control
e Variables entered on step 5: Attitudes, Subjective norms, Self-efficacy, Perceived control, Perceived need
† Dependent variable: Intender type = Higher intender (1) vs. Lower intender (0)

2. Modelling intender type with categorical measures of the TPB variables

Due to the skewed nature of the distributions for each of the direct measures in the TPB (see Figure 5.11), a median split was used to dichotomise each of the variables in the TPB (i.e., direct measures of attitudes, subjective norms and perceived behavioural control and its respective components). Table 5.78 presents the median values for each of the direct measures and Table 5.79 presents the proportion of persons falling below the median (i.e., persons with lower attitude scores, lower subjective norm scores and lower scores on perceptions of behavioural control) and above the median (i.e., persons with higher attitude scores, higher subjective norm scores and higher scores on perceptions of behavioural control) for each of the direct measures.

Table 5.78: **Median values for cognitive measures**

Cognitive measure	*n*	Median
Attitudes	509	6.5
Subjective norms	511	6.0
Perceived behavioural control	510	6.0
- Self-efficacy	510	5.5
- Perceived control	508	6.0

Table 5.79: **Proportion of persons falling above and below the median for direct measures of attitudes, subjective norms and perceived behavioural control (self-efficacy and perceived control)**

Group type	Attitudes (*n*=509)	Subjective norms (*n*=511)	Perceived behavioural control (*n*=510)	Self-efficacy (*n*=510)	Perceived control (*n*=508)
Score < median (Low group)	49.9	45.6	42.9	44.5	49.2
Score ≥ median (High group)	50.1	54.4	57.1	55.5	50.8

Binary logistic regression analysis was subsequently used to model the relationship between dental visiting intentions (i.e., intender type) and the direct measures of attitudes, subjective norms and perceived behavioural control with a median split. Perceived need for a dental visit was also included as a predictor variable within the regression model.

All TPB variables were significant predictors of dental visiting intention in the binary logistic regression model. Perceived need for a dental visit was also a strong significant predictor of dental visiting intentions. The coefficients and odds ratios for dental visiting intention are presented in Table 5.80.

The odds ratios indicated that participants with higher attitude scores were 1.8 times the odds of having higher intentions to visit the dentist compared to those with lower attitude scores. Similarly, those with a greater perceived social pressure to visit the dentist were 1.9 times the odds of having stronger intentions to visit the dentist compared to those participants with lower perceived subjective norm. In addition, those with a greater sense of control over visiting the dentist were 2.0 times the odds of having stronger intentions to visit the dentist compared to those with lower perceived behavioural control scores. Those reporting a perceived need for a dental visit were 3.3 times the odds of having stronger intentions to visit the dentist compared to those who did not perceive a need to visit the dentist.

The amount of variance in dental visiting intentions (i.e., intender type) explained by the predictor variables in the model was 18.1%. The TPB variables explained 10.1% of the variance in intender type and the addition of a measure of perceived need increased the amount of variance explained by 8.0% (see Table 5.81).

Table 5.80: Binary logistic regression analysis to predict dental visiting intentions among higher intenders and lower intenders: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Attitude type[a]	0.586	1.796	(1.179,2.736)	0.006
Subjective norm type[b]	0.653	1.921	(1.265,2.917)	0.002
Perceived behavioural control type[c]	0.700	2.014	(1.309,3.099)	0.001
Perceived need (Yes)[d]	1.202	3.328	(2.134,5.189)	P<0.0001
Constant	-1.505	0.222		P<0.0001

† Analysis used n=446 cases with complete data on all variables
a Reference category for odds ratio is 'Lower attitudes'
b Reference category for odds ratio is 'Lower subjective norms'
c Reference category for odds ratio is 'Lower perceived behavioural control'
d Reference category for odds ratio is 'No perceived need'

Table 5.81: Binary logistic regression analysis to predict dental visiting intentions among higher intenders and lower intenders: model summary

Step†	-2 Log Likelihood	Nagelkerke R^2	R^2 change
1	585.167	0.059[a]	–
2	575.240	0.088[b]	0.029
3	570.384	0.101[c]	0.013
4	540.833	0.181[d]	0.080

a Variables entered on step 1: Attitude type
b Variables entered on step 2: Attitude type, Subjective norm type
c Variables entered on step 3: Attitude type, Subjective norm type, Perceived behavioural control type
d Variables entered on step 4: Attitude type, Subjective norm type, Perceived behavioural control type, Perceived need
† Dependent variable: Intender type (High intender (1) vs. Low intender (0))

In order to determine what aspects of perceived behavioural control were having an effect on intender type, the two distinct components of the perceived behavioural control construct, i.e., self-efficacy and perceived control, were entered into the model separately so that their effects could be observed independently of the other (see Table 5.82 and Table 5.83). As it turned out, perceived control type did not emerge as a significant predictor of intender type. Instead it was found that those with a greater sense of self-efficacy in relation to visiting the dentist were 3.4 times the odds of having stronger intentions to visit the dentist compared to those with lower self-efficacy scores. All the other relationships observed previously remained consistent.

Table 5.82: Binary logistic regression analysis to predict dental visiting intentions among higher intenders and lower intenders: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Attitude type[a]	0.595	1.813	(1.189,2.764)	0.006
Subjective norm type[b]	0.601	1.824	(1.195,2.783)	0.005
Self-efficacy type[c]	0.976	2.653	(1.704,4.133)	P<0.0001
Perceived control type[d]	-0.093	0.911	(0.593,1.400)	0.671
Perceived need (Yes)[e]	1.216	3.373	(2.153,5.284)	P<0.0001
Constant	-1.585	0.205		P<0.0001

† Analysis used n=445 cases with complete data on all variables
a Reference category for odds ratio is 'Lower attitudes'
b Reference category for odds ratio is 'Lower subjective norms'
c Reference category for odds ratio is 'Lower self-efficacy'
d Reference category for odds ratio is 'Lower perceived control'
e Reference category for odds ratio is 'No perceived need'

Table 5.83: Binary logistic regression analysis to predict dental visiting intentions among higher intenders and lower intenders: model summary

Step†	-2 Log Likelihood	Nagelkerke R^2	R^2 change
1	584.409	0.059[a]	–
2	574.612	0.087[b]	0.028
3	561.493	0.123[c]	0.036
4	560.623	0.126[d]	0.003
5	530.952	0.204[e]	0.078

a Variables entered on step 1: Attitude type
b Variables entered on step 2: Attitude type, Subjective norm type
c Variables entered on step 3: Attitude type, Subjective norm type, Self-efficacy type
d Variables entered on step 4: Attitude type, Subjective norm type, Self-efficacy type, Perceived control type
e Variables entered on step 5: Attitude type, Subjective norm type, Self-efficacy type, Perceived control type, Perceived need
† Dependent variable: Intender type (High intender (1) vs. Low intender (0))

5.7.9.2 Model for predicting behaviour

Model assumptions

Binary logistic regression analysis was used to model the relationship between the dependent variable (dental visiting behaviour) and the independent variables (measures of intentions, perceived behavioural control and past behaviour). Binary logistic regression analysis was chosen, as the outcome of interest, i.e., dental visiting behaviour, was discrete and the independent variables were both continuous and categorical.

Logistic regression applies maximum likelihood estimation after transforming the dependent into a logit variable (the natural log of the odds of the dependent occurring or not). In this way, logistic regression estimates the probability of a certain event occurring. Logistic regression has many analogies to linear regression: logit coefficients correspond to beta coefficients in the logistic regression equation, the standardised logit coefficients correspond to beta weights, and a pseudo R^2 statistic (i.e., Nagelkerke R^2) is available to summarise the strength of the relationship (Garson, 2002).

Unlike linear regression, however, logistic regression does not require that the independent variables be normally distributed and linearly related, and does not assume homoscedasticity (Tabachnick and Fidell, 1996). In general, logistic regression has less stringent requirements.

Even though the logistic regression does not have many assumptions, it does require a larger sample size. It is suggested that at least 50 cases per independent variable might be required for accurate hypothesis testing, especially when the dependant variable has many groups (Grimm and Yarnold, 1995).

Behaviour model

In this section various models to predict dental visiting behaviour were developed using self-reported usual reason for visiting the dentist and actual dental attendance post-questionnaire as the dependent variables for the reasons explained in Section 5.7.8. Self-reported usual reason for visiting the dentist was categorised as 'Problem/pain' or 'Other' and for actual dental attendance post-questionnaire, various dichotomies of this variable were examined: 'Visited post-questionnaire' or 'Did not visit post-questionnaire'; 'Emergency attendance' or 'No attendance post-questionnaire'; 'General attendance' or 'No attendance post-questionnaire'; and 'Emergency attendance' or 'General attendance'. Measures of intentions and perceived behavioural control were entered as independent predictor variables in the models. In addition, a measure of past dental attendance behaviour (see Figure 5.5) was included as an independent predictor of dental visiting behaviour as familiarity with a particular behaviour may enhance its performance in the future (Hagger et al. 2001a). A decision was also made to include the indirect measures of perceived behavioural control (i.e., indirect measures of self-efficacy and perceived control) as independent predictors in the models as correlational analyses earlier showed that they were not highly correlated with their global measures and were perhaps measuring different aspects of behavioural control not captured in the global measure.

Although logistic regression does not require that independent variables be normally distributed, it was nonetheless decided that the scales be used as both continuous and dichotomised measures. Dichotomisation was used to obtain more concrete information about the differences between the participants with lower and higher levels of the measured TPB variables. In order to minimise the information bias caused by dichotomisation, the median values of the distributions of each of the TPB variables were used as the cut-off points for the respective scales.

1. Self-reported usual reason for dental visit: PROBLEM/PAIN vs. OTHER attender

In order to identify the most important predictors of self-reported dental visiting behaviour, the TPB variables and a measure of past dental attendance behaviour were entered into a binary logistic regression analysis. The direct measures of intentions and perceived behavioural control were entered at the first step, past dental visiting behaviour at step 2 and the indirect measures of self-efficacy and perceptions of control at step 3. The direct measures of intentions and perceived behavioural control together were able to explain 6.1% of the variance in 'Problem/pain' dental visiting behaviour. The addition of the past dental visiting behaviour variable at step 2 led to a 6.4% increase in the amount of variance explained, and the inclusion of the indirect measures of self-efficacy and perceived control at step 3 contributed a further 3.9% to the amount of variance explained in behaviour. Together the variables under consideration were able to explain 16.3% of the variance in 'Problem/pain' dental visiting behaviour (see Table 5.85). Inspection of the beta values revealed that all five variables entered into the regression model emerged as significant independent predictors in the final regression equation, i.e., intentions (beta=-0.219, P=0.009), perceived behavioural control (beta=-0.233, P=0.024), past dental visiting behaviour (P<0.0001), indirect measure of self efficacy (beta=-0.024, P=0.021) and indirect measure of perceived control (beta=-0.041, P=0.050).

The logistic regression coefficients were used to estimate odds ratios for each of the independent variables in the model. The coefficients and odds ratios for dental visiting behaviour are presented in Table 5.84. The odds ratio indicated that as intentions to visit the dentist increased, and as perceptions of behavioural control increased, public dental patients were less likely to report a problem and/or pain as their usual reason for visiting the dentist. Past pattern of dental attendance was also a significant independent predictor of self-reported usual reason for dental attendance. Those with a pattern of emergency attendance during the follow-up period post-baseline were 2.9 times the odds of reporting a problem and/or pain as their usual reason for visiting the dentist compared to those who did not return for dental care during the follow-up period. Persons whose past visiting behaviour was both emergency and general attendance had 3.9 times the odds of reporting a problem and/or pain as their usual reason for visiting the dentist compared to those did not return for a dental visit during the follow-up period. The odds ratio for the indirect measures of self-efficacy and perceived control indicated that as beliefs and perceptions of self-efficacy and behavioural control became more positive, public dental patients were less likely to report a problem and/or pain as their usual reason for visiting the dentist.

Table 5.84: Binary logistic regression analysis to predict self-reported usual dental visiting behaviour among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Direct INT mean score	-0.219	0.804	(0.682,0.946)	0.009
Direct PBC mean score	-0.233	0.793	(0.648,0.970)	0.024
Past behaviour[a]				0.000
- Emergency	1.051	2.861	(1.621,5.049)	0.000
- General	0.289	1.335	(0.585,3.043)	0.492
- Emergency and General	1.355	3.878	(1.901,7.909)	0.000
Indirect SE sum score	-0.024	0.977	(0.957,0.99)	0.021
Indirect PC sum score	-0.041	0.960	(0.921,1.001)	0.050
Constant	2.144	8.531		0.004

† Analysis used n=346 cases with complete data on all variables
a Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is self-reported usual reason for visiting the dentist (Problem/pain (coded as 1) vs. Other (coded as 0))

Table 5.85: Binary logistic regression analysis to predict self-reported usual dental visiting behaviour among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	436.961	0.061[a]	–
2	419.569	0.125[b]	0.064
3	408.770	0.163[c]	0.039

a Variables entered on step 1: Direct INT mean score, Direct PBC mean score
b Variables entered on step 2: Direct INT mean score, Direct PBC mean score, Past behaviour
c Variables entered on step 3: Direct INT mean score, Direct PBC mean score, Past behaviour, Indirect SE sum score, Indirect PC sum score
† Dependent variable: Self-reported usual reason for visiting the dentist: Problem/pain (coded as 1) vs. Other (coded as 0)

In order to determine what aspects of perceived behavioural control were having an effect on self-reported usual reason for visiting the dentist, the two distinct components of the perceived behavioural control construct, i.e., self-efficacy and perceived control, were entered into the model separately so that their effects could be observed independently of the other (see Table 5.86 and Table 5.87). As it turned out, the direct measure of perceived control and the indirect measure of self-efficacy did not emerge as significant predictors of usually visiting for a 'Problem/pain'. The direct measure of self-efficacy, however, was significant, indicating that self-efficacy concerns captured in this direct measure were perhaps not quite the same as those in the indirect measure of self-efficacy which was found to be insignificant. Nevertheless, the results of the regression analysis suggested that those with a greater sense of self-efficacy in relation to visiting the dentist were less likely to report a problem and/or pain as their usual reason for visiting the dentist. All the other relationships observed previously remained consistent.

Table 5.86: Binary logistic regression analysis to predict self-reported usual dental visiting behaviour among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Direct INT mean score	-0.172	0.842	(0.712, 0.997)	0.046
Direct SE mean score	-0.306	0.736	(0.584, 0.928)	0.010
Direct PC mean score	-0.060	0.941	(0.796, 1.113)	0.480
Past behaviour[a]				0.000
- Emergency	1.112	3.039	(1.704, 5.421)	0.000
- General	0.361	1.434	(0.622, 3.309)	0.398
- Emergency and General	1.454	4.281	(2.071, 8.849)	0.000
Indirect SE sum score	-0.028	0.973	(0.930, 1.018)	0.230
Indirect PC sum score	-0.023	0.977	(0.957, 0.998)	0.028
Constant	2.490	12.067		0.001

† Analysis used n=346 cases with complete data on all variables
a Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is self-reported usual reason for visiting the dentist (Problem/pain (coded as 1) vs. Other (coded as 0))

Table 5.87: Binary logistic regression analysis to predict self-reported usual dental visiting behaviour among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	428.283[a]	0.083	–
2	407.810[b]	0.157	0.074
3	401.018[c]	0.181	0.024

a Variables entered on step 1: Direct INT mean score, Direct SE mean score, Direct PC mean score
b Variables entered on step 2: Direct INT mean score, Direct SE mean score, Direct PC mean score, Past behaviour
c Variables entered on step 3: Direct INT mean score, Direct SE mean score Direct PC mean score, Past behaviour, Indirect SE sum score, Indirect PC sum score
† Dependent variable: Self-reported usual reason for visiting the dentist: Problem/pain (coded as 1) vs. Other (coded as 0)

Modelling self-reported usual reason for dental visit with categorical measures of the TPB variables

Categorical measures of the direct measures of self-efficacy and perceived control (derived using a median split) were entered into the regression model, along with the indirect measures of self-efficacy and perceived control, and past dental visiting behaviour. Intender type, past dental visiting behaviour and the belief-based measures of self-efficacy and perceived control emerged as significant predictors of reporting a problem and/or pain as the usual reason for visiting the dentist. The estimated odds of higher intenders usually reporting a problem and/or pain as the usual reason for visiting the dentist decreased by 46.7%, compared to lower intenders. Those with a past pattern of emergency dental visiting or emergency and general dental visiting had 2.9 times the odds and 3.9 times the odds respectively of reporting a problem and/or pain as the usual reason for visiting the dentist compared to those who did not have a past pattern of visiting. The estimated odds of reporting a problem and/or pain as the usual reason for visiting a dentist decreased as respondent's beliefs about self-efficacy and the control they had in relation to visiting the dentist became more positive.

Overall, the variables under consideration were able to explain 16.2% of the variance in 'Problem/pain' dental visiting behaviour (see Table 5.89).

Table 5.88: Binary logistic regression analysis to predict self-reported usual dental visiting behaviour among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intender type[a]	-0.629	0.533	(0.325, 0.875)	0.013
Self-efficacy type[b]	-0.368	0.692	(0.404, 1.184)	0.179
Perceived control type[c]	-0.214	0.807	(0.497, 1.311)	0.387
Past behaviour[d]				0.000
- Emergency	1.056	2.875	(1.624, 5.089)	0.000
- General	0.249	1.283	(0.561, 2.935)	0.555
- Emergency and General	1.369	3.931	(1.918, 8.058)	0.000
Indirect SE sum score	-0.044	0.957	(0.915, 1.000)	0.049
Indirect PC sum score	-0.026	0.975	(0.955, 0.995)	0.012
Constant	0.245	1.278		0.408

† Analysis used n=346 cases with complete data on all variables
a Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
d Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is self-reported usual reason for visiting the dentist (Problem/pain (coded as 1) vs. Other (coded as 0))

Table 5.89: Binary logistic regression analysis to predict self-reported usual dental visiting behaviour among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	436.612[a]	0.051	–
2	418.220[b]	0.120	0.069
3	406.482[c]	0.162	0.042

a Variables entered on step 1: Intender type, Self-efficacy type, Perceived control type

b Variables entered on step 2: Intender type, Self-efficacy type, Perceived control type, Past behaviour

c Variables entered on step 3: Intender type, Self-efficacy type, Perceived control type, Past behaviour, Indirect SE sum score, Indirect PC sum score

† Dependent variable: Self-reported usual reason for visiting the dentist: Problem/pain (coded as 1) vs. Other (coded as 0)

2. Actual dental attendance behaviour

VISITED post-questionnaire vs. DID NOT VISIT post-questionnaire

Before modelling specific type of actual dental attendance behaviour (e.g., Emergency or General attendance), a model was developed to predict dental attendance regardless of the type of visit. Recall from Table 5.53, 35.4% of respondents who returned the questionnaire made a dental visit in the period following the questionnaire. In order to predict whether or not a person would visit the dentist, the direct measures of dental visiting intentions and perceived behavioural control were entered as predictor variables into a logistic regression model. These results are presented in Table 5.90 and Table 5.91.

Both dental visiting intention and perceived behavioural control were significant predictors of dental attendance in the binary logistic regression model. The coefficients and odds ratios for dental attendance are presented in Table 5.90. The estimated odds of visiting the dentist increased by 21% and 22% when mean intention scores and perceived behavioural control scores respectively increased by one. Overall, the model was able to explain 4.5% of the variation in dental attendance.

Table 5.90: Binary logistic regression analysis to predict dental attendance (post-questionnaire) among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intentions‡	0.188	1.206	(1.060, 1.373)	0.005
Perceived behavioural control‡	0.200	1.222	(1.039, 1.436)	0.015
Constant	-2.800	0.061		0.000

† Analysis used n=495 cases with complete data on all variables
‡ Direct measures (mean scores)
Note: Dependent variable is dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0))

Table 5.91: Binary logistic regression analysis to predict dental attendance (post-questionnaire) among adult public dental patients: model summary

Step†	-2 Log Likelihood	Nagelkerke R^2	R^2 change
1	634.187[a]	0.028	–
2	627.879[b]	0.045	0.017

a Variables entered on step 1: Direct INT mean score
b Variables entered on step 2: Direct INT mean score, Direct PBC mean score
† Dependent variable: Dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0))

The self-efficacy and perceived control components of the perceived behavioural control construct were subsequently entered into the model as separate constructs so that their effects could be observed independently of the other. Intention and self-efficacy emerged as significant independent predictors of having made a dental visit post-questionnaire but perceived control did not (see Table 5.92). The odds ratios indicated that as intention scores and self-efficacy scores increased by one, the estimated odds of visiting the dentist increased by 16% and 33% respectively. Overall, this model was able to explain 6.5% of the variation in actual dental attendance post-questionnaire (see Table 5.93).

Table 5.92: Binary logistic regression analysis to predict actual dental attendance (post-questionnaire) among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intentions‡	0.151	1.163	(1.018,1.329)	0.026
Self-efficacy‡	0.286	1.331	(1.126,1.574)	0.001
Perceived control‡	-0.001	0.999	(0.879,1.135)	0.987
Constant	-2.956	0.052		0.000

† Analysis used n=493 cases with complete data on all variables
‡ Direct measures (mean scores)
Note: Dependent variable is dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0))

Table 5.93: Binary logistic regression analysis to predict actual dental attendance (post-questionnaire) among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	632.148[a]	0.029	–
2	618.597[b]	0.065	0.036

a Variables entered on step 1: Direct INT mean score
b Variables entered on step 2: Direct INT mean score, Direct SE mean score Direct PC mean score
† Dependent variable: Actual dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0)

Modelling VISITED post-questionnaire vs. DID NOT VISIT post-questionnaire with categorical TPB variables

When dichotomous TPB variables were used, the logistic regression analysis revealed the significance of levels of self-efficacy, but not levels of intentions and perceived control, in determining dental attendance post-questionnaire. Those with stronger self-efficacy had 1.8 times the odds of actually visiting the dentist compared to those with lower levels of self-efficacy (see Table 5.94).

The amount of variance explained in dental attendance post-questionnaire by the dichotomised predictor variables in this model was 5.3% (see Table 5.95).

Table 5.94: Binary logistic regression analysis to predict actual dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intender type[a]	0.320	1.377	(0.931, 2.037)	0.109
Self-efficacy type[b]	0.588	1.800	(1.203, 2.694)	0.004
Perceived control type[c]	0.335	1.398	(0.951, 2.056)	0.089
Constant	-1.293	0.275		0.000

† Analysis used n=493 cases with complete data on all variables
a Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
Note: Dependent variable is dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0))

Table 5.95: Binary logistic regression analysis to predict actual dental attendance post-questionnaire among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	637.241[a]	0.015	–
2	623.066[b]	0.053	0.038

a Variables entered on step 1: Intender type
b Variables entered on step 2: Intender type, Self-efficacy type, Perceived control type
† Dependent variable: Actual dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0)

Modelling VISITED post-questionnaire vs. DID NOT VISIT post-questionnaire with the inclusion of past behaviour

In order to enhance the predictive ability of this behaviour model, a measure of past behaviour (see Figure 5.5 and Table 5.5) was included in the model as a potential predictor of dental attendance post-questionnaire. These results are presented in Table 5.96 and Table 5.97.

Dental visiting intentions, self-efficacy and past visiting behaviour were significant predictors of actually having made a dental visit post-questionnaire in the binary logistic regression model. Perceived control, however, was not a significant predictor of dental attendance post-questionnaire. The coefficients and odds ratios are presented in Table 5.96. The estimated odds of having made a dental visit post-questionnaire increased by 19.2% and 29.0% when mean intention and self-efficacy scores respectively increased by one. In addition, those who had a past pattern of emergency dental care seeking behaviour were 2.9 times the odds of having made a dental visit post-questionnaire compared to those who did not have a past pattern of visiting (i.e., those who did not visit the dentist post-baseline during the observed follow-up period). Those who had a past pattern of both emergency and general dental care attendance were 2.4 times the odds of having made a dental visit post-questionnaire compared to those who did not have a past pattern of visiting.

The amount of variance in actual dental attendance post-questionnaire explained by the predictor variables in the model was 14.1%. The addition of a measure of past behaviour increased the amount of variance explained by 7.5% (see Table 5.97).

Table 5.96: Binary logistic regression analysis to predict actual dental attendance (post-questionnaire) among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intentions‡	0.176	1.192	(1.035, 1.374)	**0.015**
Self-efficacy‡	0.254	1.290	(1.078, 1.544)	**0.006**
Perceived control‡	-.011	0.989	(0.857, 1.142)	0.885
Past behaviour[a]				**0.000**
- Emergency	1.077	2.936	(1.782, 4.837)	0.000
- General	-.357	0.700	(0.292, 1.680)	0.424
- Emergency and General	0.890	2.436	(1.384, 4.287)	0.002
Constant	-3.499	0.030		0.000

† Analysis used n=470 cases with complete data on all variables
‡ Direct measures (mean scores)
a Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0))

Table 5.97: Binary logistic regression analysis to predict actual dental attendance (post-questionnaire) among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	600.944[a]	0.031	–
2	588.636[b]	0.066	0.035
3	560.903[c]	0.141	0.075

a Variables entered on step 1: Direct INT mean score
b Variables entered on step 2: Direct INT mean score, Direct SE mean score, Direct PC mean score
c Variables entered on step 3: Direct INT mean score, Direct SE mean score Direct PC mean score, Past behaviour
† Dependent variable: Actual dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0)

Modelling VISITED post-questionnaire vs. DID NOT VISIT post-questionnaire with categorical measures of the TPB variables and past behaviour

In this particular model, self-efficacy type, perceived control type and past behaviour were significant predictors of having made a dental visit post-questionnaire (see Table 5.98). Intender type had borderline significance (i.e., P=0.065). Participants classified as being in the higher self-efficacy group and the higher perceived control group had 1.5 times the odds and 1.6 times the odds respectively of having made a dental visit post-questionnaire. Those with a past pattern of emergency attendance were 3.0 times the odds of visiting post-questionnaire compared to those who did not have a past pattern of visiting. Persons whose past visiting behaviour was for both emergency and general care had 2.5 times the odds of visiting the dentist post-questionnaire compared to those did not return for a dental visit during the baseline follow-up period. The amount of variance in actual dental attendance post-questionnaire explained by the predictor variables in this model was 13.2% (see Table 5.99).

Table 5.98: Binary logistic regression analysis to predict actual dental attendance (post-questionnaire) among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable[†]	Beta	OR	95% CI for OR	Sig.
Intender type[a]	0.394	1.482	(0.976, 2.251)	0.065
Self-efficacy type[b]	0.435	1.545	(1.003, 2.379)	0.048
Perceived control type[c]	0.451	1.569	(1.040, 2.369)	0.032
Past behaviour[d]				0.000
- Emergency	1.105	3.018	(1.830, 4.980)	0.000
- General	-0.351	0.704	(0.294, 1.688)	0.432
- Emergency and General	0.902	2.466	(1.402, 4.338)	0.002
Constant	-1.937	0.144		0.000

† Analysis used n=470 cases with complete data on all variables
a Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
d Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is dental attendance post- questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0))

Table 5.99: Binary logistic regression analysis to predict actual dental attendance (post-questionnaire) among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	605.726[a]	0.017	–
2	593.123[b]	0.053	0.036
3	564.132[c]	0.132	0.079

a Variables entered on step 1: Intender type

b Variables entered on step 2: Intender type, Self-efficacy type, Perceived control type

c Variables entered on step 3: Intender type, Self-efficacy type, Perceived control type, Past behaviour

† Dependent variable: Actual dental attendance post-questionnaire (Yes, visited (coded as 1) vs. No, did not visit (coded as 0)

EMERGENCY attendance vs. NO attendance post-questionnaire

In order to identify the most important predictors of emergency attendance post-questionnaire (compared to no attendance post-questionnaire), the TPB variables were entered into a binary logistic regression analysis. The direct measure of intentions was entered at the first step and the direct measures of self-efficacy and perceived control were entered at the second step. The logistic regression coefficients were used to estimate odds ratios for each of the independent variables in the model. The coefficients and odds ratios for emergency dental visiting are presented in Table 5.100.

Self-efficacy was the only variable to emerge as a significant predictor of emergency attendance (P=0.005). Participants with higher mean scores on the self-efficacy scale had greater odds for emergency dental attendance post-questionnaire. The logistic regression analysis revealed this relationship when the effect of intentions and perceived control were controlled for. The amount of variance in emergency dental attendance post-questionnaire explained by the predictor variables in this model was 5.3% (see Table 5.101).

Table 5.100: Binary logistic regression analysis to predict emergency dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intentions‡	0.096	1.101	(0.946, 1.281)	0.213
Self-efficacy‡	0.290	1.337	(1.092, 1.637)	0.005
Perceived control‡	0.049	1.050	(0.887, 1.243)	0.568
Constant	-3.429	0.032		0.000

† Analysis used n=426 cases with complete data on all variables
‡ Direct measures (mean scores)
Note: Dependent variable is actual dental attendance post-questionnaire (Emergency (coded as 1) vs. Did not visit (coded as 0))

Table 5.101: Binary logistic regression analysis to predict emergency dental attendance post-questionnaire among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	480.307[a]	0.015	–
2	468.819[b]	0.053	0.038

a Variables entered on step 1: Intention
b Variables entered on step 2: Intention, Self-efficacy, Perceived control
† Dependent variable: Actual dental attendance post-questionnaire (Emergency (coded as 1) vs. Did not visit (coded as 0))

Modelling EMERGENCY attendance vs. NO attendance post-questionnaire with categorical measures of the TPB variables

When dichotomous TPB variables were used, the logistic regression analysis revealed the significance of levels of self-efficacy and perceived control in determining emergency dental attendance post-questionnaire. Those with stronger self-efficacy and perceptions of control had greater odds (1.8 and 1.9 times the odds respectively) of attending for an emergency CoC compared to those with lower levels of self-efficacy and perceived control (see Table 5.102).

The amount of variance explained in emergency dental attendance post-questionnaire by the dichotomised predictor variables in this model was 6.7% (see Table 5.103).

Table 5.102: Binary logistic regression analysis to predict emergency dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intender type[a]	.202	1.224	(0.770, 1.946)	0.393
Self-efficacy type[b]	.610	1.840	(1.139, 2.973)	0.013
Perceived control type[c]	.667	1.949	(1.226, 3.097)	0.005
Constant	-1.914	0.147		0.000

† Analysis used n=426 cases with complete data on all variables
a Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
Note: Dependent variable is actual dental attendance post-questionnaire (Emergency (coded as 1) vs. Did not visit (coded as 0))

Table 5.103: Binary logistic regression analysis to predict emergency dental attendance post-questionnaire among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	482.789[a]	.006	–
2	464.754[b]	.067	0.061

a Variables entered on step 1: Intender type
b Variables entered on step 2: Intender type, Self-efficacy type, Perceived control type
† Dependent variable: Actual dental attendance post-questionnaire (Emergency (coded as 1) vs. Did not visit (coded as 0))

Modelling EMERGENCY attendance vs. NO attendance post-questionnaire with continuous measures of the TPB variables and past behaviour

When a measure of past dental visiting behaviour was included in the model with the direct measures of intention, self-efficacy and perceived control, self-efficacy and past behaviour emerged as significant predictors of emergency attendance. The logistic regression coefficients and odds ratios are presented in Table 5.104. The odds ratios indicated that those with higher levels of self-efficacy were 1.3 times the odds of attending for emergency dental care compared to those with lower self-efficacy. Those with a past pattern of emergency attendance or emergency and general attendance were 2.9 times the odds and 3.1 times the odds respectively of visiting for emergency dental care compared to those who did not have a past pattern of visiting during the baseline follow-up period.

The amount of variance explained in emergency dental attendance post-questionnaire by the predictor variables in this model was 12.7%. The addition of a measure of past behaviour increased the amount of variance explained by 7.2% (see Table 5.105).

Table 5.104: Binary logistic regression analysis to predict emergency dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intentions‡	0.127	1.135	(0.966, 1.334)	0.123
Self-efficacy‡	0.235	1.265	(1.020, 1.570)	0.033
Perceived control‡	0.064	1.066	(0.892, 1.274)	0.482
Past behaviour[a]				0.000
- Emergency	1.054	2.868	(1.558, 5.280)	0.001
- General	-0.258	0.773	(0.266, 2.243)	0.636
- Emergency and General	1.147	3.149	(1.624, 6.106)	0.001
Constant	-4.083	0.017		0.000

† Analysis used n=406 cases with complete data on all variables
‡ Direct measures (mean scores)
a Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is actual dental attendance post-questionnaire (Emergency (coded as 1) vs. Did not visit (coded as 0))

Table 5.105: Binary logistic regression analysis to predict emergency dental attendance post-questionnaire among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	444.453[a]	0.055	–
2	423.264[b]	0.127	0.072

a Variables entered on step 1: Intention, Self-efficacy, Perceived control
b Variables entered on step 2: Intention, Self-efficacy, Perceived control, Past behaviour
† Dependent variable: Actual dental attendance post-questionnaire (Emergency (coded as 1) vs. Did not visit (coded as 0))

Modelling EMERGENCY attendance vs. NO attendance post-questionnaire with categorical measures of the TPB variables and past behaviour

When a measure of past behaviour was included in the model with the categorical TPB variables, the dichotomised perceived control measure and past behaviour measure both had significant, independent effects on emergency attendance post-questionnaire. The logistic regression coefficients and odds ratios are presented in Table 5.106. The odds ratios indicated that those with higher levels of perceived control were 2.2 times the odds of attending for emergency dental care compared to those with lower perceived control. Those with a past pattern of emergency attendance were 3.0 times the odds of visiting for emergency dental care compared to those who did not have a past pattern of visiting. Persons whose past visiting behaviour was for both emergency and general care had 3.2 times the odds of visiting the dentist for emergency care compared to those did not return for a dental visit during the baseline follow-up period.

The amount of variance explained in emergency dental attendance post-questionnaire by the predictor variables in the model was 14.3%. The addition of a measure of past behaviour increased the amount of variance explained by 7.4% (see Table 5.107).

Table 5.106: Binary logistic regression analysis to predict emergency dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intender type[a]	0.318	1.375	(0.837, 2.257)	0.208
Self-efficacy type[b]	0.381	1.464	(0.875, 2.448)	0.146
Perceived control type[c]	0.789	2.200	(1.342, 3.608)	0.002
Past behaviour[d]				0.000
- Emergency	1.111	3.037	(1.636, 5.638)	0.000
- General	-0.229	0.795	(0.272, 2.322)	0.675
- Emergency and General	1.163	3.199	(1.640, 6.238)	0.001
Constant	-2.627	0.072		0.000

† Analysis used n=406 cases with complete data on all variables
b Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
d Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is actual dental attendance post-questionnaire (Emergency (coded as 1) vs. Did not visit (coded as 0))

Table 5.107: Binary logistic regression analysis to predict emergency dental attendance post-questionnaire among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	457.339[a]	0.009	–
2	440.472[b]	0.069	0.060
3	418.424[c]	0.143	0.074

a Variables entered on step 1: Intender type
b Variables entered on step 2: Intender type, Self-efficacy type, Perceived control type
c Variables entered on step 3: Intender type, Self-efficacy type, Perceived control type, Past behaviour
† Dependent variable: Actual dental attendance post-questionnaire (Emergency (coded as 1) vs. Did not visit (coded as 0))

GENERAL attendance vs. NO attendance post-questionnaire

In order to identify the most important predictors of general dental care attendance post-questionnaire, the direct measures of dental visiting intentions, self-efficacy and perceived control were entered into a binary logistic regression analysis. The direct measure of intentions was entered at step 1 in the model and the direct measures of self-efficacy and perceived control at step 2. The logistic regression coefficients used to estimate odds ratios for general attendance for each of the independent variables in the model are presented in Table 5.108.

Dental visiting intentions and self-efficacy emerged as significant predictors of general attendance, whereas perceived control was not significant. The estimated odds of having made a general visit post-questionnaire increased by 27.7% and 35.1% when mean intention and self-efficacy scores respectively increased by one. Overall, the variables in the model were able to explain 6.9% of the variance in general dental attendance (see Table 5.109).

Table 5.108: Binary logistic regression analysis to predict general dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intentions‡	0.245	1.277	(1.032, 1.580)	0.024
Self-efficacy‡	0.301	1.351	(1.054, 1.732)	0.017
Perceived control‡	-0.108	0.898	(0.748, 1.078)	0.248
Constant	-3.965	0.019		0.000

† Analysis used n=384 cases with complete data on all variables
‡ Direct measures (mean scores)
Note: Dependent variable is actual dental attendance post-questionnaire (General (coded as 1) vs. Did not visit (coded as 0))

Table 5.109: Binary logistic regression analysis to predict general dental attendance post-questionnaire among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	345.558[a]	0.042	–
2	339.204[b]	0.069	0.027

a Variables entered on step 1: Intention
b Variables entered on step 2: Intention, Self-efficacy, Perceived control
† Dependent variable: Actual dental attendance post-questionnaire (General (coded as 1) vs. Did not visit (coded as 0))

Modelling GENERAL attendance vs. NO attendance post-questionnaire with categorical measures of the TPB variables

When dichotomous TPB variables were used, the logistic regression analysis revealed the significance of self-efficacy and the borderline significance of levels of intention in determining general dental attendance post-questionnaire. Those with a stronger sense of self-efficacy and higher dental visiting intentions had greater odds (1.77 and 1.79 times the odds respectively) of attending for a general CoC compared to those with lower levels of self-efficacy and intentions to visit (see Table 5.110).

The amount of variance explained in general dental attendance post-questionnaire by the dichotomised predictor variables in this model was 4.3% (see Table 5.111).

Table 5.110: Binary logistic regression analysis to predict general dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intender type[a]	0.572	1.771	(0.998, 3.146)	0.051
Self-efficacy type[b]	0.583	1.791	(1.007, 3.185)	0.047
Perceived control type[c]	-0.145	0.865	(0.500, 1.496)	0.605
Constant	-2.171	0.114		0.000

† Analysis used n=384 cases with complete data on all variables
b Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
Note: Dependent variable is actual dental attendance post-questionnaire (General (coded as 1) vs. Did not visit (coded as 0))

Table 5.111: Binary logistic regression analysis to predict general dental attendance post-questionnaire among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	349.427[b]	0.026	–
2	345.377[b]	0.043	0.017

a Variables entered on step 1: Intender type
b Variables entered on step 2: Intender type, Self-efficacy type, Perceived control type
† Dependent variable: Actual dental attendance post-questionnaire (General (coded as 1) vs. Did not visit (coded as 0))

Modelling GENERAL attendance vs. NO attendance post-questionnaire with continuous measures of the TPB variables and past behaviour

When a measure of past dental visiting behaviour was included in the model with the direct measures of intention, self-efficacy and perceived control, intentions and past behaviour emerged as significant predictors of general attendance. Self-efficacy reached borderline significance. The logistic regression coefficients and odds ratios are presented in Table 5.112. The odds ratios indicated that those with higher levels of intention were 1.3 times the odds of attending for emergency dental care compared to those with lower intentions. Those with a past pattern of emergency attendance or emergency and general attendance were 3.0 times the odds and 1.5 times the odds respectively of visiting for general dental care compared to those who did not have a past pattern of visiting during the baseline follow-up period.

The amount of variance explained in general dental attendance post-questionnaire by the predictor variables in this model was 13.0%. The addition of a measure of past behaviour increased the amount of variance explained by 6.4% (see Table 5.113).

Table 5.112: Binary logistic regression analysis to predict general dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intentions‡	0.288	1.333	(1.062, 1.675)	0.013
Self-efficacy‡	0.256	1.291	(0.994, 1.678)	0.056
Perceived control‡	-0.101	0.904	(0.745, 1.097)	0.308
Past behaviour[a]				0.003
- Emergency	1.109	3.030	(1.508, 6.088)	0.002
- General	-0.505	0.603	(0.160, 2.274)	0.455
- Emergency and General	0.387	1.473	(0.624, 3.481)	0.377
Constant	-4.526	0.011	(1.062, 1.675)	0.000

† Analysis used n=367 cases with complete data on all variables
‡ Direct measures (mean scores)
a Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is actual dental attendance post-questionnaire (General (coded as 1) vs. Did not visit (coded as 0))

Table 5.113: **Binary logistic regression analysis to predict general dental attendance post-questionnaire among adult public dental patients: model summary**

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	324.742[a]	0.066	–
2	309.647[b]	0. 130	0.064

a Variables entered on step 1: Intention, Self-efficacy, Perceived control
b Variables entered on step 2: Intention, Self-efficacy, Perceived control, Past behaviour
† Dependent variable: Actual dental attendance post-questionnaire (General (coded as 1) vs. Did not visit (coded as 0))

Modelling GENERAL attendance vs. NO attendance post-questionnaire with categorical measures of the TPB variables and past behaviour

When a measure of past behaviour was included in the model with the categorical TPB variables, only the dichotomised intention measure and past behaviour measure had significant, independent effects on general attendance post-questionnaire. The logistic regression coefficients and odds ratios are presented in Table 5.114. The odds ratios indicated that those with higher levels of intention to visit the dentist had 1.9 times the odds of attending for general dental care compared to those with lower levels of intention to visit the dentist. Those with a past pattern of emergency attendance were 3.0 times the odds of visiting for general dental care compared to those who did not have a past pattern of visiting.

The amount of variance explained in general dental attendance post-questionnaire by the predictor variables in the model was 10.4%. The addition of a measure of past behaviour increased the amount of variance explained by 6.4% (see Table 5.115).

Table 5.114: Binary logistic regression analysis to predict general dental attendance post-questionnaire among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intender type[a]	0.625	1.868	(1.022, 3.415)	0.042
Self-efficacy type[b]	0.497	1.643	(0.889, 3.039)	0.113
Perceived control type[c]	-0.074	0.929	(0.520, 1.657)	0.802
Past behaviour[d]				0.003
- Emergency	1.083	2.953	(1.478, 5.898)	0.002
- General	-0.492	0.611	(0.163, 2.289)	0.465
- Emergency and General	0.399	1.491	(0.636, 3.497)	0.359
Constant	-2.693	0.068		0.000

† Analysis used n=367 cases with complete data on all variables
b Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
d Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is actual dental attendance post-questionnaire (General (coded as 1) vs. Did not visit (coded as 0))

Table 5.115: Binary logistic regression analysis to predict general dental attendance post-questionnaire among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	334.310[a]	0.024	–
2	330.606[b]	0.040	0.016
3	315.973[c]	0.104	0.064

a Variables entered on step 1: Intender type
b Variables entered on step 2: Intender type, Self-efficacy type, Perceived control type
c Variables entered on step 3: Intender type, Self-efficacy type, Perceived control type, Past behaviour
† Dependent variable: Actual dental attendance post-questionnaire: (General (coded as 1) vs. Did not visit (coded as 0)

EMERGENCY attendance vs. GENERAL attendance post-questionnaire

The next stage of modelling actual dental attendance involved examining predictors of emergency dental attendance over general dental attendance. A preliminary analysis revealed that entering the TPB variables into the model as continuous measures did not pick up any significant differences between the two groups. This may have been due to a reduction in the sample size when looking at the type of dental care received (i.e., emergency or general) for only those who actually made a dental visit post-questionnaire. As a result, it was decided to present the results for the models using the dichotomous TPB variables, as they appeared to be more sensitive in detecting differences between participants with lower and higher levels of the measured TPB variables.

Thus, in order to identify the most important predictors of emergency dental attendance over general dental attendance, the dichotomous TPB variables, the belief-based measures of self-efficacy and perceived control and a measure of past dental attendance behaviour were entered into a binary logistic regression analysis. The dichotomous measures of intentions, self-efficacy and perceived control were entered at the first step, the indirect measures of self-efficacy and perceptions of control at step 2 and past dental visiting behaviour at step 3. The logistic regression coefficients and odds ratios are presented in Table 5.116. Level of perceived control and perceived control beliefs emerged as significant predictors of emergency attendance. Unlike in the other behaviour models examined, past dental visiting behaviour was not significant. Nevertheless, the odds ratios indicated that those with higher levels of perceived control over visiting the dentist had 2.6 times the odds of attending for emergency dental care compared to those with lower levels of perceived control. The odds ratio for the indirect measure of perceived control indicated that as beliefs about perceptions of behavioural control became more positive, public dental patients were less likely to visit the dentist for an emergency. Overall, a model containing measures of public dental patients' perceived control over visiting the dentist was able to explain 8.9% of the variance in emergency dental attendance (see Table 5.117).

Table 5.116: Binary logistic regression analysis to predict actual dental attendance behaviour among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intender type[a]	-0.505	0.603	(0.252, 1.446)	0.257
Perceived behavioural control				
- Self-efficacy type[b]	0.332	1.393	(0.501, 3.873)	0.525
- Perceived control type[c]	0.946	2.576	(1.053, 6.302)	**0.038**
Indirect SE sum score	-0.073	0.930	(0.861, 1.004)	0.063
Indirect PC sum score	-0.040	0.961	(0.928, 0.995)	**0.024**
Past behaviour[d]				0.235
- Emergency	0.347	1.415	(0.493, 4.057)	0.519
- General	-0.045	0.956	(0.126, 7.282)	0.965
- Emergency and General	1.196	3.306	(0.941, 11.618)	0.062
Constant	-1.201	0.301		0.081

† Analysis used n=114 cases with complete data on all variables
a Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
d Reference category for odds ratio is 'Did not return for a dental visit'
Note: Dependent variable is actual dental attendance post-questionnaire (Emergency (coded as 1) vs. General (coded as 0))

Table 5.117: Binary logistic regression analysis to predict actual dental attendance behaviour among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	151.497	0.068	–
2	143.234	0.157	0.089
3	138.736	0.202	0.045

a Variables entered on step 1: Intender type, Self-efficacy type, Perceived control type
b Variables entered on step 2 Intender type, Self-efficacy type, Perceived control type, Indirect measure of self-efficacy, Indirect measure of perceived control
c Variables entered on step 3: Intender type, Self-efficacy type, Perceived control type, Indirect measure of self-efficacy, Indirect measure of perceived control, Past behaviour
† Dependent variable: Actual dental attendance behaviour post-questionnaire: Emergency (coded as 1) vs. General (coded as 0)

Since past dental visiting behaviour did not have a significant effect in the model, it was decided to enter a patient's self-reported usual reason for visiting the dentist into the model to determine if this had any influence on their dental visiting behaviour. Although this self-reported measure of behaviour was previously used as a dependent variable, its use here was not considered inappropriate as it may display independent effects on dental visiting. Table 5.118 and Table 5.119 present the results of this logistic regression analysis.

Usual reason for visiting the dentist was a significant predictor of visiting the dentist for emergency dental care. Those reporting a 'Problem/pain' as their usual reason for visiting the dentist were 2.5 times the odds of visiting the dentist for emergency dental care compared to those visiting for 'Other' reasons. Level of perceived control and perceived control beliefs remained significant predictors of emergency attendance, with the relationships of these variables with emergency visiting remaining consistent with that observed previously.

The inclusion of a self-reported measure of behaviour increased the variance explained in emergency dental attendance by 4.5%. Overall, the model was able to explain 20.3% of the variance in emergency visiting.

Table 5.118: Binary logistic regression analysis to predict actual dental attendance behaviour among adult public dental patients: beta coefficients, odds ratios and 95% CI

Independent variable†	Beta	OR	95% CI for OR	Sig.
Intender type[a]	-0.491	0.612	(0.263,1.424)	0.254
Perceived behavioural control				
- Self-efficacy type[b]	0.457	1.580	(0.588,4.246)	0.365
- Perceived control type[c]	1.104	3.017	(1.268,7.182)	0.013
Indirect SE sum score	-0.055	0.946	(0.877,1.021)	0.155
Indirect PC sum score	-0.036	0.965	(0.935,0.996)	0.029
Usual visit reason – Problem/pain[d]	0.935	2.546	(1.083,5.985)	0.032
Constant	-1.363	0.256		0.024

† Analysis used n=122 cases with complete data on all variables
a Reference category for odds ratio is 'Lower intender'
b Reference category for odds ratio is 'Lower self-efficacy'
c Reference category for odds ratio is 'Lower perceived control'
d Reference category for odds ratio is 'Other'
Note: Dependent variable is actual dental attendance post-questionnaire (Emergency (coded as 1) vs. General (coded as 0))

Table 5.119: Binary logistic regression analysis to predict actual dental attendance behaviour among adult public dental patients: model summary

Step†	-2 Log likelihood	Nagelkerke R^2	R^2 change
1	161.164[a]	0.072	–
2	152.643[b]	0.158	0.086
3	147.898[c]	0.203	0.045

a Variables entered on step 1: Intender type, Self-efficacy type, Perceived control type
b Variables entered on step 2 Intender type, Self-efficacy type, Perceived control type, Indirect measure of self-efficacy, Indirect measure of perceived control
c Variables entered on step 3: Intender type, Self-efficacy type, Perceived control type, Indirect measure of self-efficacy, Indirect measure of perceived control, Usual visit reason
† Dependent variable: Actual dental attendance behaviour post-questionnaire: Emergency (coded as 1) vs. General (coded as 0)

5.8 Summary and conclusions

Attitudes are seen as being directed toward a specific behaviour. They contain two components: the outcomes to the person and the value of those outcomes to the person. Each such outcome will have a value (positive or negative) to the person, and the combination of these values will dictate their overall attitude toward visiting a dentist in the public dental service. Along with attitudes, one must also consider the person's perceptions of the opinions of other people who are significant to them, together with their motivation to comply with those opinions. So in this case it would be necessary to ascertain whether respondents believe that people who matter to them would approve of them visiting a public sector dentist, and how much the respondents care about that approval. Consideration must also be given to the perceived behavioural control an individual has over performing a specific behaviour. Perceived behavioural control refers to people's perception of the ease or difficulty of performing the behaviour of interest. Behavioural control is clearly important in determining whether an individual performs a specific behaviour, as the resources and opportunities available dictate to some extent the likelihood of behavioural achievement. Perceived behavioural control comprises a set of beliefs that deals with the presence or absence of requisite resources and opportunities that ultimately determine an individual's intentions and behaviour.

This research demonstrated the applicability of the TPB to dental visiting. By focusing on specific beliefs and attitudes with regards to dental visiting within the public dental system, an increased understanding of dental visiting among this group of disadvantaged adults was made possible.

The theory's ability to predict intentions and behaviour together with the descriptive information of the underlying behavioural, normative and control beliefs provides substantial information that could be used for the design of effective interventions. The findings suggest that educational programs focusing on behavioural beliefs of the benefits of dental visiting as well as addressing the structural barriers should help promote more effective/preventive dental attendance.

5.8.1 Global measures

Three factors were hypothesised to influence the willingness and ability of adult public dental patients to visit the dentist. These were attitude, subjective norm and perceived behavioural control. Overall, the sample of public dental patients studied held fairly favourable attitudes toward visiting the dentist, perceived positive social pressure to do so and generally felt in control of visiting the dentist. The association of each of these factors with intention to visit the dentist varied, with correlational analyses showing attitude toward dental visiting to be more strongly associated with intention, followed by the self-efficacy component of the perceived behavioural control construct and subjective norm.

Key conclusions

1. Intentions, attitudes, subjective norms and perceptions of behavioural control (represented by self-efficacy and perceived control) concerning visiting the dentist were fairly positive in the sample as a whole.

2. As expected, attitudes appear to be one influence on intentions, but a positive attitude in no way guarantees a positive intention. This is supported by the TPB.

5.8.2 Intentions

Intentions to visit the dentist were quite strong among this sample of public dental patients, with 77.5% of respondents indicating that they did intend to visit the dentist. However, when a dichotomised measure of intention was used, differences were found among 'lower intenders' and 'higher intenders'. Lower intenders reported significantly lower mean scores in relation to dental visiting attitudes, subjective norms and perceptions of behavioural control with lower intenders reporting feeling less confident about visiting the dentist. There were also specific beliefs that significantly discriminated between higher intenders and lower intenders. Higher intenders had higher positive attitude scores concerning beliefs about preventing tooth decay, maintaining a healthy dentition, preventing dental problems in the future, keeping teeth looking good, having good oral health, being seen promptly for their dental appointment and dental anxiety. Lower intenders perceived that they would be dentally anxious, contributing to negative attitudes towards visiting the dentist.

In comparison to higher intenders, lower intenders perceived lower levels of positive social pressure to visit the dentist from their family, partner, parent/s and friend/s.

Both higher and lower intenders perceived long waiting lists, the cost of dental care, having had a bad dental experience, not being able to choose the treating dentist and being afraid or anxious as barriers to visiting the dentist. Higher intenders reported greater levels of difficulty visiting the dentist as a result of long waiting lists, while lower intenders reported greater levels of difficulty visiting the dentist in relation to being dentally anxious.

Key conclusions

1. Specific beliefs that distinguish higher intenders from lower intenders provide potential targets for health interventions.

5.8.3 Attitudes and behavioural beliefs

Attitudes are held to be a function of an individual's belief that the behaviour will lead to various outcomes and the value attached to those outcomes. The key therefore in trying to change *attitudes* toward the desired behaviour is by either 1) increasing the perception that the behaviour will lead to a desired outcome, and/or 2) increasing the value attached to the outcome to which the behaviour is seen to lead. For example, one may promote dental visiting as an effective way of monitoring one's oral health. One may then emphasise the importance of the individual's time in visiting the dentist and highlight the beneficial nature of doing so.

Inspection of the beliefs of the likely outcomes of dental visiting provides insight into the attitudinal considerations that guide adult cardholders to use public dental services. Among the important considerations found were preventing tooth decay, maintaining the health of one's teeth, preventing future dental problems, keeping one's teeth looking good, preventing pain in their teeth, mouth or dentures, maintaining good oral health, being able to receive preventive treatment, restorations and dental advice from a dental professional, and fixing any dental problems that exist.

Participants reported less positive feelings regarding their beliefs about painful dental treatment, having to wait a long time in the waiting room for their designated appointment, not being seen promptly and being anxious or afraid.

The implications for interventions based on these finding are seemingly straightforward. To promote dental visiting, the value and benefits of visiting the dentist should be emphasised. In this study population, beliefs about the benefits and value of dental visiting were already ingrained, so programs that continue to reinforce this message could be useful. In addition, addressing people's dental fears and anxieties through dental educational programs or improving the dentist-patient relationship through training dentists to better deal with anxious/fearful patients may assist in encouraging dental attendance (not only for when a problem arises but also for check-ups).

Key conclusions

1. Among the strongest expectations of visiting the dentist were getting dental problems fixed, receiving dental advice from a dental professional, keeping teeth healthy, preventing pain in teeth, mouth or dentures, and preventing any future dental problems.

2. Respondents placed high value on all of the positive outcomes (such as those mentioned in point 1 above) of visiting the dentist.

3. Respondents tended to expect that they would have to wait a long time in the waiting room for their appointment.

4. The beliefs of keeping teeth healthy, preventing future dental problems, and having good oral health were the ones most strongly connected with positive attitudes and intentions concerning dental visiting. Other beliefs that had a significant positive correlation with both attitudes and intentions were beliefs about preventing tooth decay, keeping teeth looking good, preventing pain in teeth, mouth or dentures, receiving preventive treatments, receiving fillings to fix dental decay and preventing tooth loss.

5. Even though some respondents saw 'downsides' of visiting the dentist (such as receiving unnecessary extractions and having to wait a long time in the waiting

room for their appointment), these appear not to undermine attitudes and intentions very much for the respondents as a whole.

6. People's attitude towards visiting the dentist was largely, though not wholly, determined by their beliefs about the consequences of doing so and the personal importance of those consequences. The extent to which a person believed that visiting the dentist would lead to them experiencing positive dental outcomes, was significantly correlated with their intention to do so.

5.8.4 Subjective norms and normative beliefs

Subjective norms are held to be functions of what an individual thinks or believes key referent individuals believe should be done, and whether the individual is motivated to comply with the referent's expectations. The model implies that this component can be changed either by 1) changing individuals' perceptions of their key referents' norms, and/or 2) by changing their motivation to comply with the norms.

The normative expectations of various individuals and groups were found to be an important consideration in one's decision to visit a public dentist, and a potential source of influence with respect to dental visiting. Included among these normative referents were family, partner, parent/s, mother and friends. Participants perceived a reasonably strong level of support to visit the dentist from each of these referents. Participants, however, expressed a somewhat lower degree of motivation to comply with the wishes of some of these important others (i.e., parent/s, mother and friends). Participants indicated that they were more motivated to comply with the wishes of their family or partner. All things considered, however, participants generally felt positive social pressure from these referents to visit the dentist. Therefore any kind of intervention promoting dental attendance that target each of these normative beliefs, particularly family or partners, can be expected to have a positive effect on influencing an individual's decision to seek dental care.

In a study conducted by Woolgrove, Cumberbatch and Gelbier (1987), normative influences were found to have a powerful effect on regular dental attendance. Consequently it was of their opinion that individual health education in the surgery may fail and that greater success in encouraging regular attendance might be had with family or community-based education programs. Indeed, this may be an approach that could be considered within this study population.

Key conclusions

1. In this study, respondents reported that, on the whole, other people close to them were, or would be, supportive of them visiting the dentist. This was a fairly consistent finding for all subgroups examined.

2. In examining the associations of the direct measures of attitudes and intentions with subjective norms, it was found that people's beliefs about the opinions of others seemed to matter for both dental attitudes and dental visiting intentions. The extent to which a person believed that people close to them would approve of them visiting the dentist (i.e. subjective norm) had a significant positive correlation with their intention to do so and with their attitudes.

3. Social contacts played a significant role in a person's decision to visit the dentist. Support from each of the normative referents toward visiting the dentist was perceived to be quite strong. In particular, it was found that respondent's perceptions of the opinions and support of their family, mother, parent/s, and friend/s were significantly associated with their intention to make a dental visit. Perceived social pressure stemming from each normative referent was also found to be significantly associated with their attitudes towards visiting. Thus, the greater the perceived positive support to visit the dentist, the more likely respondents were to have positive attitudes towards dental visiting, and the more likely they were to intend to visit the dentist.

5.8.5 Perceived behavioural control and control beliefs

Perceived behavioural control is held to be a function of control factors/beliefs and evaluations of these factors/beliefs. As described by Ajzen (1991), control factors are obstacles or impediments that may prevent one from effectively carrying out a particular behaviour. The key therefore in trying to alter perceptions of behavioural control is through emphasising the ease with which the behaviour can be carried out, in combination with an evaluation that carrying out the behaviour is indeed possible.

The specific control beliefs assessed in this research provided only limited information on the factors that might influence dental visiting. The pattern of results indicated that among the important control factors were the cost of dental care, long waiting lists and dental anxiety and/or fear. A tentative suggestion, therefore, would be to design interventions that target these sorts of control factors. It would seem that within the public dental service these sorts of control factors would have the greatest impact on how one is able to access and use dental care services.

Key conclusions

1. Costly dental treatment, long waiting lists, co-payments and being dentally anxious and/or afraid were seen as the biggest barriers to visiting the dentist.

2. Perceptions about long waiting lists as a barrier to dental visiting appeared to undermine attitudes and intentions more than most other control factors. This was the only control factor that had a significant negative correlation with both intentions and attitudes. However, even though many people associated other negative factors with visiting the dentist these appear *not* to undermine attitudes and intentions very much for the respondents as a whole.

3. On the whole, respondents believed they had control over visiting the dentist. The extent to which individuals felt confident about this was connected with their intentions to do so and their dental visiting behaviour.

5.8.6 Behaviour

5.8.6.1 Self-reported behaviour

Differences in attitudes, subjective norms and perceptions of behavioural control were examined among those reporting a 'Problem/pain' or 'Other reason' as their usual reason for visiting the dentist.

Overall, the direct measures of the cognitive TPB variables revealed that differences existed between 'Problem/pain' and 'Other' attenders in relation to intentions to visit the dentist and perceptions of behavioural control. In comparison to 'Other' attenders, Problem/pain' attenders reported significantly lower intentions to visit the dentist and also reported perceiving significantly less control over visiting the dentist, particularly in relation to self-efficacy concerns.

In comparison to 'Other' attenders, 'Problem/pain' attenders reported significantly less positive attitudes in relation to beliefs about preventing tooth decay, keeping teeth healthy, preventing future dental problems, keeping teeth looking good, maintaining good oral health, having teeth cleaned, receiving preventive treatment, painless dental treatment and being seen promptly. These beliefs were not held as strongly by 'Problem/pain' attenders, thus contributing to a less positive attitude toward dental visiting among this group.

'Problem/pain' attenders reported significantly lower levels of control in relation to beliefs about the cost of dental treatment, being afraid about the dental visit and being anxious about the dental visit. 'Problem/pain' attenders perceived these factors as being a barrier to dental care more so than what 'Other' attenders did.

5.8.6.2 Actual behaviour

Differences between respondents who received an emergency or general CoC as their first CoC post-questionnaire were examined. Those receiving an emergency CoC were labelled as an 'Emergency attender' while those receiving a general CoC were labelled 'General attender'.

Overall, both Emergency and General attenders reported strong positive intentions, attitudes, subjective norms and perceptions of control toward visiting the dentist when questioned directly about these aspects of dental visiting.

When the belief-based measures of attitude, subjective norm and perceptions of control were examined for differences between Emergency and General attenders, findings revealed that Emergency and General attenders both held favourable attitudes towards visiting the dentist in terms of beliefs about the benefits of doing so, both groups experienced some level of positive social pressure to visit the dentist by their family, partner, parent/s and friends, but both groups, to some degree, did not feel in control over visiting the dentist, both in terms of self-efficacy concerns and perceptions of control in relation to specific control factors.

Interestingly, respondents, when asked in general whether they felt in control over visiting the dentist, reported that they did, but when questioned about the influence of specific factors, such as long waiting lists, cost of dental care, dental anxiety and dental fear, they reported no longer feeling in control of visiting the dentist. Emergency attenders, in particular, reported lower levels of control than General attenders. The direct measure of perceived behavioural control appeared to capture other aspects of control, in relation to dental visiting, with which the respondent felt more comfortable.

Overall, both groups perceived that there were outcomes of dental visiting that encouraged dental attendance (such as keeping teeth healthy, preventing future problems in their teeth, mouth or dentures), thus contributing to positive attitudes towards dental visiting. However, both Emergency and General attenders indicated that having to wait a long time in the waiting room for their designated appointment would discourage dental attendance, thus contributing to negative attitudes toward dental visiting.

Emergency and General attenders alike believed that costly dental treatment, long waiting lists, co-payments, having to pay for treatment regardless of the amount, bad dental experiences, being dentally afraid or anxious hindered their control regarding visiting the dentist.

5.8.7 Predictors of dental visiting intentions

This research sought to identify the motivational factors underlying intentions to visit the dentist in a sample of users of public dental services. The use of a hierarchical regression model allowed for the valuation of the importance of each of the constructs of the TPB relative to the overall model. Although only the final model was presented, the contribution of each construct to the overall model was described. This research identified a number of factors that were predictive of intentions to visit the dentist over and above that explained by age or sex. The four factors to emerge as important predictors of intentions to visit the dentist were attitudes, subjective norms, self-efficacy and perceived control. Users of public dental services were less likely to believe that the decision to visit the dentist was under their control, although those intending to visit were more likely to have positive attitudes toward visiting the dentist, perceive support from significant others to visit the dentist and be confident within themselves of their ability to make a visit. These results suggested that although one may hold positive beliefs and attitudes toward visiting the dentist, and despite feeling comfortable in going to the dentist, there are external influences that affect their intentions to visit the dentist. Thus, visiting a public dentist is facilitated by their external environment. As a result, the most effective interventions may be those that attempt to change structural/organisational influences. Direct attempts at changing dental visiting patterns will therefore need to involve initiatives that improve access to care, such as addressing the cost of dental care or the long waiting times that currently exist within the public dental system. Interestingly, perceived need, when added to the intention model as a potential predictor, subdued the effect of perceived control, and significantly increased the amount of variance explained in dental visiting intention. One explanation for this may be that the perceived need for dental treatment may involve needing to attend a public dental clinic for emergency dental care. This being the case, perceptions of control regarding external factors like long waiting lists, for example, do not apply, and therefore do not have an effect on one's intention to visit.

Overall, for dental visiting intentions, perceived need contributed to the majority of the explanatory power of the final model. Self-efficacy contributed the next largest amount to the explanatory power of the model, followed by attitudes and subjective norms.

The relative significance of the variables in the models examined are summarised in Table 5.120 and Table 5.121. The models summarised in Table 5.120 are for those models that used a continuous measure of dental visiting intention as the dependent variable and, the models summarised in Table 5.121 used a dichotomous measure of dental visiting intention.

Key conclusions

1. Attitudes, subjective norms and self-efficacy were significant positive predictors of intentions to visit the dentist whereas perceived control was a significant negative predictor of intentions to visit the dentist. Perceived need, when added to the intentions model, was a significant predictor of intentions to visit, but subdued the effect of perceived control. It appeared that having a perceived need for dental care outweighed any concerns about perceptions of control over intending to visit the dentist. Age and sex made an insignificant contribution to the intentions model.

2. In terms of the influence of the individual constructs of the TPB on intentions:

   - The more positive a person's attitudes toward visiting the dentist, the stronger their intention to visit the dentist.

   - The extent to which respondents perceived support from significant others was found to be a significant predictor of their intention to visit the dentist, even after other relevant factors (which included attitudes, perceived behavioural control and perceived need) had been statistically allowed for. This is in spite of the fact that most respondents were not highly motivated to comply with the wishes of referents, indicating that they perhaps tended to do the things that they themselves wanted to, rather than the things their important others thought they should do. This suggests that what an individual believes to be the opinion of other people (which is assumed to bear at least some relation to their actual opinions) influences that individual's intentions even though they are not fully aware of it perhaps.

   - Elements of perceived behavioural control also predicted intention. The more that persons saw difficulties in visiting the dentist and the less confident they felt about being able to visit the dentist, the lower their intention to make a dental visit.

Table 5.120: Summary of the linear regression models predicting dental visiting intentions

Model	Variables entered into model	Dependent variable: Direct Intention† Sig.	(+/-)[a]	Adj-R^2
1	Dir ATT†	*	(+)	12.3%
	Dir SN†	***	(+)	
	Dir SE†	*	(+)	
	Dir PC†	*	(-)	
1	Dir ATT†	***	(+)	20.5%
	Dir SN†	*	(+)	
	Dir SE†	***	(+)	
	Dir PC†	ns		
	Perceived need¥	***	(+)	

Sig. Statistical significance
a Direction of the relationship, i.e., positive or negative beta value
† continuous variable
‡ dichotomous variable, reference category for odds ratio was 'lower level' of the variable measured
¥ reference category for odds ratio was 'No perceived need'
ns not statistically significant
*** (P<0.0001); **(P<0.01); * (P<0.05)

Table 5.121: Summary of the logistic regression models predicting intender type

Model	Variables entered into model	Dependent variable#: Higher intender vs. Lower intender Sig.	(+/-)[a]	Adj-R^2
1	Dir ATT†	*	(+)	22.1%
	Dir SN†	**	(+)	
	Dir SE†	***	(+)	
	Dir PC†	ns		
	Perceived need¥	***	(+)	
2	ATT type‡	**	(+)	20.4%
	SN type‡	**	(+)	
	SE type‡	***	(+)	
	PC type‡	ns		
	Perceived need¥	***	(+)	

Sig. Statistical significance
Dichotomised dependent variable: Intender type = Higher intender (1) vs. Lower intender (0)
a Direction of the relationship, i.e., positive or negative beta value
† continuous variable
‡ dichotomous variable, reference category for odds ratio was 'lower level' of the variable measured
¥ reference category for odds ratio was 'No perceived need'
ns not statistically significant
*** (P<0.0001); **(P<0.01); * (P<0.05)

5.8.8 Predictors of dental visiting behaviour

This section summarises the findings of the dental visiting behaviour models developed for the two types of behaviour measures used as the dependent variables, i.e., self-reported usual reason for dental visit and actual dental attendance behaviour collected via the EXACT MIS.

5.8.8.1 Using a self-reported measure of behaviour

Direct measures of dental visiting intentions and perceptions of behavioural control (broken down into self-efficacy concerns and perceived control), indirect measures of self-efficacy and perceived control, and past dental visiting behaviour were entered into a binary logistic regression model to predict self-reported usual reason for visiting the dentist. The outcome category for the dependent variable was usually attending for a 'Problem/pain' versus 'Other reason'.

With the exception of the direct measure of perceived control and the belief-based measure of self-efficacy, all variables emerged as significant predictors and together the variables under consideration were able to explain 18.1% of the variance in self-reported dental visiting behaviour. The addition of a measure of past behaviour increased the amount of variance explained by 7.4%. Similar results were obtained when dichotomous TPB variables were used.

The results indicated that those who reported greater intentions to visit the dentist and were confident in their ability to visit the dentist (in terms of self-efficacy beliefs), were less likely to report a problem and/or pain as their usual reason for visiting. However, those who perceived a lack of control over visiting the dentist in terms of their beliefs about long waiting lists, costly dental care and dental anxiety/fear acting as barriers to care, were more likely to report usually attending for a problem and/or pain. A pattern of past for emergency dental care attendance also increased one's odds of reporting a problem and/or pain as their usual reason for visiting the dentist.

Key conclusions

1. Intentions and perceptions of behavioural control were significant predictors of self-reported behaviour. Specific beliefs relating to self-efficacy (e.g., being

dentally afraid or anxious) and perceptions of control (e.g., barriers to dental care such as cost and long waiting lists) were also found to be significant predictors of usually visiting the dentist for a problem/pain. Past behaviour, in particular past emergency care seeking behaviour, when added to the behaviour model, was a significant predictor of reporting a problem/pain as the usual reason for visiting the dentist.

2. Increased intention to visit the dentist was associated with decreased odds of usually reporting a problem/pain as their usual reason for visiting. This result suggested that intention might relate to intention to visit for general care.

3. When the perceived behavioural control construct was broken down into its respective components (i.e., self-efficacy and perceived control), perceived control was not significant but the globally measured self-efficacy component was. The self-efficacy component appeared to be driving the significance of the perceived behavioural control construct, suggesting that self-efficacy concerns were important predictors of usually visiting for a problem/pain. Those with a greater sense of self-efficacy had lower odds of usually reporting a problem/pain as their usual reason for visiting.

4. The significance of the belief-based measure of perceived control in the model indicated that beliefs about long waiting lists and cost of dental care hindering dental attendance increased one's odds of reporting a problem/pain as their usual reason for visiting the dentist.

The relative significance of the variables in the models examined are summarised in Table 5.122.

Table 5.122: Summary of the logistic regression models predicting self-reported usual reason for dental visit

		SELF-REPORTED USUAL REASON FOR DENTAL VISIT		
		Problem/pain vs. Other		
Model	Variables entered into model	Sig.	(+/-)[a]	Adj-R^2
1	Dir INT†	*	(-)	18.1%
	Dir SE†	**	(-)	
	Dir PC†	ns		
	Past E Behaviour¥	***	(+)	
	Indir SE†	ns		
	Indir PC†	*	(-)	
2	INT type‡	*	(-)	16.2%
	SE type‡	ns		
	PC type‡	ns		
	Past E Behaviour¥	***	(+)	
	Indir SE†	*	(-)	
	Indir PC†	*	(-)	

E = Emergency dental care attendance
Sig. Statistical significance
a Direction of the relationship, i.e., positive or negative beta value
† continuous variable
‡ dichotomous variable, reference category used was 'lower level' of the variable measured
¥ reference category for odds ratio was 'No past pattern of visiting'
ns not statistically significant
*** ($P<0.0001$); **($P<0.01$); * ($P<0.05$)

5.8.8.2 Using an observed measure of behaviour

VISITED post-questionnaire vs. DID NOT VISIT post-questionnaire

The amount of variance explained in non-specific type of actual dental attendance post-questionnaire (i.e., visited post-questionnaire vs. did not visit post-questionnaire) by measures of intention and perceived behavioural control was small, only 6.5%. The inclusion of past behaviour in the model strengthened the model's predictive power, with the amount of variance explained increasing to 14.1%. Recall that during the period of post-questionnaire follow-up only 35.4% of questionnaire respondents visited the dentist. Perhaps those who had yet to visit during the observed post-questionnaire follow-up period (which spanned 1.17 years) did in fact intend to visit but simply had not yet done so. In fact, 77.4% reported that they did intend to visit the dentist (as indicated by mean scores being above the midpoint of 4), but only 35.4% of respondents actually did visit. Perhaps a longer follow-up period was needed to better capture the dental behaviour of study participants. As Sutton (1998) explains, longer time intervals allow more opportunities for the behaviour to be performed, increasing the intention-behaviour correspondence.

EMERGENCY attendance vs. NO attendance post-questionnaire

In the models examined to predict emergency attendance over no attendance post-questionnaire, the model that explained the greatest amount of variance in emergency dental attendance was the one that used a dichotomous measure of perceived control and a measure of past behaviour. Those with higher levels of perceived control had greater odds of visiting for emergency dental care compared to those reporting lower levels of perceived control, as did those with a past pattern of emergency visiting or emergency and general visiting when compared to those who had no past pattern of dental attendance. These results suggest that those who reported having greater perceptions of control over visiting the dentist were also more likely to have attended in the past for emergency dental care. Perhaps those with a past pattern of emergency dental visiting were familiar with how the public dental service operated and with knowing how to go about obtaining a dental appointment. This familiarity with the behaviour may have increased their perceptions of control. Prior to the addition of past behaviour, the model that used dichotomised measures of the TPB variables was more sensitive to detecting differences between participants with lower and higher levels of the measured TPB variables. In this model, levels of self-efficacy and perceived control had significant, independent effects on emergency dental attendance. Those with a stronger sense of self-efficacy and greater perceptions of control almost had double the odds of attending for an emergency CoC compared to those with lower levels of self-efficacy and perceived control. Intention did not come up as a significant predictor of emergency attendance versus no attendance in any of the models. This reflects a poor intentions-behaviour correspondence in this particular model, i.e., intentions to visit the dentist did not reflect intention to visit for emergency dental care. This may be because no one intends to visit for an emergency in the absence of dental problems.

GENERAL attendance vs. NO attendance post-questionnaire

When only the TPB variables were entered into a logistic regression model to predict general attendance over no attendance post-questionnaire, the direct measures of intention and self-efficacy (both measured on interval scales) emerged as significant predictors and explained a greater proportion of the variance in general attendance. When dichotomised TPB variables were used, self-efficacy maintained its significance in the model but perceived control and intentions to visit the dentist were no longer important in the model. This particular model also explained less of the variance in general dental attendance than the former model.

When a measure of past behaviour was added to the models, the direct measure of intention (using an interval scale) and the measure of past behaviour explained the greatest amount of variance in general dental attendance. The direct measure of self-efficacy (measured on an interval scale) was not significant. Increased intention to visit the dentist was associated with greater odds of visiting the dentist for general dental care. Past behaviour appeared to subdue the effects of self-efficacy. It was found that those who had a past pattern of emergency attendance were more likely to attend for a general CoC post-questionnaire. This may possibly reflect an offer of general care being made to participants. Past behaviour was captured 2 years prior to their actual behaviour measure and so it is possible that respondents may have been on a waiting list for care and whilst waiting, were seeking emergency care (as this was the only care available to them from the public dental clinics at the time). Intention to visit was a significant predictor of general visiting indicating that general attendance was more likely to occur if there was a strong intention to visit the dentist. Perhaps those who had their name on a waiting list reported their intention to visit for general dental care when their name came to the top of the list.

The relative significance of the variables in the models examined are summarised in Table 5.123.

Table 5.123: Summary of the logistic regression models predicting actual dental attendance post-questionnaire

		ACTUAL DENTAL ATTENDANCE POST-QUESTIONNAIRE								
		Visited vs. Did not visit			E visit vs. Did not visit			G visit vs. Did not visit		
Model	Variables entered into model	Sig.	(+/-)[a]	Adj-R^2	Sig.	(+/-)[a]	Adj-R^2	Sig.	(+/-)[a]	Adj-R^2
1	Dir INT†	*	(+)	6.5%	ns		5.3%	*	(+)	6.9%
	Dir SE†	**	(+)		*	(+)		*	(+)	
	Dir PC†	ns			ns			ns		
2	INT type‡	ns		5.3%	ns		6.7%	0.051	(+)	4.3%
	SE type‡	*	(+)		*	(+)		*	(+)	
	PC type‡	ns			**	(+)		ns		
3	Dir INT†	*	(+)	14.1%	ns		12.7%	*	(+)	13.0%
	Dir SE†	**	(+)		*	(+)		0.056	(+)	
	Dir PC†	ns			ns			ns		
	Past E Behaviour¥	***	(+)		***	(+)		***	(+)	
4	INT type‡	0.065	(+)	13.2%	ns		14.3%	*	(+)	10.4%
	SE type‡	*	(+)		ns			ns		
	PC type‡	*	(+)		**	(+)		ns		
	Past E Behaviour¥	***	(+)		***	(+)		**	(+)	

E = Emergency dental care attendance
G = General dental care attendance
Sig. Statistical significance
a Direction of the relationship, i.e., positive or negative beta value
† continuous variable
‡ dichotomous variable, reference category for odds ratio was 'lower level' of the variable measured
¥ reference category for odds ratio was 'No past pattern of visiting'
ns not statistically significant
*** ($P<0.0001$); **($P<0.01$); * ($P<0.05$)

EMERGENCY attendance vs. GENERAL attendance post-questionnaire

Emergency dental attendance was significantly influenced by perceptions of behavioural control over visiting the dentist, as well as beliefs about structural factors hindering dental attendance. Not surprising, patient's who reported usually visiting the dentist for a problem and/or pain also had greater odds of engaging in emergency dental attendance. These results suggest that system level factors play a decisive role in emergency dental attendance and need to be addressed if wanting to promote routine, preventive dental attendance. The results of the logistic regression models are summarised in Table 5.124.

Table 5.124: Summary of the logistic regression models predicting actual dental attendance post-questionnaire

		ACTUAL DENTAL ATTENDANCE BEHAVIOUR POST QUESTIONNAIRE		
		Emergency vs. General		
Model	**Variables entered into model**	Sig.	(+/-)[a]	Adj-R^2
1	INT type‡	ns		20.2%
	SE type‡	ns		
	PC type‡	*	(+)	
	Indir SE†	ns		
	Indir PC†	*	(-)	
	Past behaviour	ns		
2	INT type‡	ns		20.3%
	SE type‡	ns		
	PC type‡	*	(+)	
	Indir SE†	ns		
	Indir PC†	*	(-)	
	Self-report behaviour – Problem/pain¥	*	(+)	

E = Emergency dental care attendance
Sig. Statistical significance
a Direction of the relationship, i.e., positive or negative beta value
† continuous variable
‡ dichotomous variable, reference category used was 'lower level' of the variable measured
¥ reference category for odds ratio was 'Other' reason
ns not statistically significant
*** (P<0.0001); **(P<0.01); * (P<0.05)

6 Discussion

This study was conducted because there was limited evidence of the influence of psychosocial factors and health beliefs on public dental patients' patterns of public dental service use in South Australia, particularly the use of emergency dental services, and more information was needed to help inform the delivery of services. The aim of this study therefore was to provide comprehensive information regarding the oral health status, dental beliefs, values and attitudes, and the patterns of service use and barriers to use of public dental health services, with the ultimate aim being to inform dental health policy and SADS delivery of care.

Since the focus of the study was visiting the dentist and using the public dental service, particularly for emergency dental care, the underlying issue concerns *predicting* behaviour; specifically, what influences someone to visit the dentist for emergency dental care. This means that this research was committed to modelling participants' future behaviours partly on the basis of their current intentions, attitudes, subjective norms and perceptions of behavioural control.

This section presents a discussion of the thesis results. The first part of this section addresses the findings in relation to the baseline study, the longitudinal follow-up of the baseline participants and participant's attitudes toward visiting the dentist, beliefs about social pressure to visit the dentist (i.e., subjective norms) and perceptions of behavioural control with relation to dental visiting. The second part of this section considers the strengths and limitations of the study in terms of its design and also examines the representativeness of the sample used. Implications of the study findings are then discussed in relation to their significance for oral health policy interventions.

6.1 Research findings

It is clear that many aspects of adult oral health and oral health behaviour could be improved. In light of the available evidence, the future oral health of disadvantaged populations and pressure on the public dental service are legitimate areas of concern.

A better account of the attitudinal factors that contribute to positive decisions in the use of dental services can broaden our understanding of dental attendance among adults, and this information can assist in preparing effective intervention strategies aimed at promoting preventive dental visits.

6.1.1 Baseline study

The sample from this baseline sample represented a population of adults from low SES backgrounds. Not uncommon to this subgroup is the likelihood of poorer oral health. Indices used to measure oral health status indicated that this was indeed the case, with high levels of dental need among the sample as reflected by the number of decayed teeth. Those in the emergency baseline sample however, had significantly more decayed and missing teeth, and also experienced significantly worse periodontal conditions than those in the general baseline sample. Further analyses conducted among this baseline sample revealed that for those attending for emergency dental care, service provision was dominated by oral surgery services. A notable difference in service provision patterns existed between emergency and general dental patients, with lower percentages of persons visiting for an emergency receiving diagnostic, preventive, restorative and prosthodontic services and higher percentages having general/miscellaneous and extraction services. The visiting behaviour of emergency patients, as observed at baseline, was not conducive to good oral health outcomes. These patients reported usually visiting for a problem/pain, had a more recent pattern of visiting and they also tended to visit the dentist more frequently than general patients. Subsequent research examining dental beliefs, values and attitudes revealed that this sample of public dental patients had reasonably favourable attitudes toward visiting the dentist and so patterns of service use appears to be a reflection of the structural barriers to dental care, such as the cost of dental treatment and the long waiting lists for general dental care. Unless these structural barriers to dental care are addressed, patients will continue to engage in dental visiting behaviours that place them at risk for worse oral health outcomes, and this pattern of behaviour will be perpetuated indefinitely.

6.1.2 Pattern of dental visiting behaviour

The longitudinal follow-up of the baseline sample showed that despite the large demand for emergency care and the long waiting lists for general dental care across public dental clinics in South Australia, this particular group of public dental patients were still managing to cycle through care quite frequently. The baseline sample was followed for an average period of 3 years. In this time, an average of 2.8 CoC were received among those who returned, with an average time interval of 10.4 months between CoC. The quantity of general care made available to some patients was an interesting finding, especially in view of the current waiting lists for routine care. This may reflect dentists choosing to treat particular patients, a case of 'queue-jumping' or preferential treatment perhaps. Dentists may feel that certain patients, given the appropriate treatment, have the opportunity for a good oral health outcome, and perhaps this outcome will not be realised if particular patients are forced to wait for care or seek that care through the emergency dental care stream. If this is the case, this creates a bias in service provision and consequently inequity in care. However, this issue needs to be examined further.

Longitudinal analyses have demonstrated that among the emergency baseline sample, more so than the general baseline sample, there was an accumulation of unmet dental needs influencing the service-mix among this group. Because of their deteriorating oral health conditions, the provision of services as part of a general CoC were still mainly treatment-focussed rather than preventive based. As people continue to cycle through emergency care, the backlog of unmet dental need will continue to increase and in doing so, will limit the amount of preventive services able to be provided. Unless access to dental services is improved, patients will continue to engage in visiting patterns that will ultimately result in them being the recipients of an undesirable pattern of service provision. This will have a detrimental impact on the long-term oral health of public dental patients. The social and environmental contexts in which these dental visiting behaviours occur also need to be addressed.

6.1.3 Dental beliefs, values and attitudes

The modal beliefs of adult public dental patients about visiting the dentist and dental health appear to be quite positive. Most people associate positive attributes to visiting the dentist. In fact, most people appear to want to act on their knowledge and beliefs about visiting the dentist, but have indicated that barriers to dental care within the public dental system prevent them from doing so. For adult public dental patients, barriers to dental care can set up a vicious cycle of lack of access, increasing unmet needs, and the development of chronic dental health problems that were avoidable. Having identified some of these barriers (i.e., cost and long waiting lists), strategies should now be developed and implemented to resolve these identified access barriers.

The broad message arising from this research, for all target groups, is to enhance desired positive features of visiting the dentist, as well as features which are seen as undesirable or sources of difficulty. These features are interrelated; for example, reducing the time spent on waiting lists for general care not only reduces difficulties in access to care, but also enhances some positive aspects of dental visiting e.g., the option to receive preventive dental care services to improve and maintain oral health. However, the 'catch 22' for the public dental service is that reducing the waiting time on waiting lists will inevitably require greater resources, such as more funding and more staff to manage the increased workload for the number of patients being seen for routine dental care. This is inevitable in a service with increasing demands. In addition, this research has demonstrated that people's perceptions of the opinions of those important to them are associated with their intention to visit the dentist. This is a significant finding which shows that the role of other people in the decision-making process includes normative pressure as well as information-giving.

6.1.3.1 Predicting intentions and behaviour

Reviews and meta-analyses have found that intentions typically account for 20-40% of the variance in prospective studies of social and health-related behaviours (Armitage and Conner, 2001; Rise, Thompson and Verplanken, 2003). However, simply having positive intentions to perform a behaviour does not guarantee that a person will carry that behaviour out. A number of reasons may account for this, such as the presence of competing goals/intentions, lack of information on how to carry out the behaviour, lack of motivation in initialising the behaviour or difficulty in getting started.

One of the criticisms of the TPB is that it explains relatively high proportions of the variance in intentions, but is a weaker predictor of actual behaviour. This weak intention-behaviour correspondence means that many people with positive intentions do not perform the intended behaviour (Sheeran, 2002). Thus, the TPB model provides only a partial account of how intentions translate into action (Armitage and Conner, 2000). Thus, the TPB might be useful in explaining intentional dental visiting where a decision is made to visit the dentist; however, it may be less useful in explaining non-intentional visiting such as visiting the dentist for unexpected emergency dental care.

Godin and Gok (1996) reviewed the performance of the TPB across a range of health-related behaviours and found that the TPB performed reasonably well in predicting intentions but was less efficient in predicting behaviours. They found that the amount of variance explained was quite low for clinical and screening behaviours, whereas more variance was accounted for in addictive behaviours and HIV/AIDS-related behaviours. Randall and Wolff (1994) (cited in Godin and Gok, 1996) suggested that the 'inability to enact one's intention in some areas may result from personal and environmental control factors' (p94). As Godin and Gok (1996) point out, a range of steps are involved in clinical and screening type behaviours. In an example used by Godin and Gok, if one considers getting a mammogram, the steps involved would be making an appointment with a doctor, attending this appointment to obtain a referral for a mammogram, contacting the mammogram clinic to arrange an appointment and then attending this appointment. The prediction of this behaviour (i.e., getting a mammogram) is located at one end of the continuum and may be too distant to assure the attainment of a good prediction. A similar scenario may exist when trying to visit a dentist within the public dental service. If one wants to visit the dentist for a check-up, they must first ring the public dental service for an appointment, they are then placed on a dental waiting list to be contacted when an appointment becomes available, after waiting to be contacted they receive a letter from the service where they must again make contact with the public dental service to secure an appointment and then attend the appointment. With these types of health-related behaviours, perceived and actual control are quite different, and so under these conditions, perceived behavioural control may contribute negligibly to the prediction of behaviour (Godin and Gok, 1996), as was found in this research.

This research demonstrated the application of the TPB to understanding dental visiting behaviour within the public dental system. In this research, a modest amount of the variability in intentions and dental visiting behaviour could be explained by respective components of the model. Modest predictive power for intentions and behaviour can be explained by a number of factors:

1. The low amount of variance explained in intentions and behaviour may have been the result of a lack of variation in responses to scales measuring intentions, attitudes, subjective norms and perceived behavioural control. This may reflect a bias in the original sample selection. For example, those agreeing to participate in

the baseline study may have been those people with fairly, or very strong, positive attitudes.

2. The intentions measure used here assesses views on intentions to visit the dentist in general (whether it be a visit for a problem and/or check-up or some other reason) whereas behaviour taps into specific reasons for visiting the dentist, i.e., for a problem or check-up. As a consequence this would reduce the level of correlation between the components of the TPB and the behaviour measure.

3. Non-habitual behaviours can exhibit temporal instability, so a stable construct such as attitudes or the like cannot predict a particular behaviour successfully.

4. The problem with the intention scale and the behaviour measure in terms of variance explained is the lack of correspondence between the intention scale, which has 7 points, and the behaviour measure, which has 2 points. It is impossible to have a linear relationship, let alone a perfect linear relationship and explain 100% of the variation when there are unequal numbers of scale categories (Sutton, 1998). Better correspondence would have been achieved if the number of categories used to measure intention and behaviour were equal.

   Treating intention and behaviour as genuine dichotomies (i.e., either the person has an intention to visit the dentist or they do not, and either the person made a dental visit or they did not) might allow a perfect relationship between the two (Sutton, 1998). However, even with equal categories for the two measures, if the distributions do not match, then the correlation between the two measures will be less than perfect. Presented below is a 2x2 table for dichotomous measures of intention and behaviour. There is a 23%/77% No/Yes split on intention but a 65%/35% No/Yes split on behaviour. This cross-tabulation shows the cell frequencies that yield the largest possible correlation between intention and behaviour. The correlation (i.e., the phi coefficient for a 2x2 table) is 0.09. Because the two distributions do not match, only a small proportion of the variance in behaviour will be explained by intentions. This explains why intentions was not a significant predictor of actual behaviour in the majority of the behaviour models examined.

Marginal distributions of intention and behaviour

INTENTION to visit	BEHAVIOUR (i.e., made a visit post-questionnaire) Yes	No	Total
Yes	82	31	113
No	242	146	388
Total	324	177	501

5. A high intentions-behaviour correlation is likely to be obtained if intentions remain stable. However, intentions may change. Sutton (1998) explains that the longer the time period between the measurement of intention and behaviour, the greater the probability that unexpected events will occur, leading to changes in intention. This may certainly be the case when measuring one's intention to visit the dentist in a public dental clinic. One problem when trying to measure dental visiting behaviour within the public dental sector is that one may initially intend to visit the dentist for a check-up but given the long waiting lists be unable to. So whilst waiting for their name to come to the top of the waiting list, they may experience/develop some dental problems (or existing dental problems may be exacerbated) that required them to attend for emergency dental care. Thus their intentions are changed. A similar circumstance may arise for someone who does not intend to ever visit the dentist but develops an unexpected dental problem and ends up making an emergency dental visit. Or perhaps, their personal circumstances change and they become ineligible to receive public dental care and therefore do not make a dental visit.

   In addition, Sutton (1998) comments that some participants may not be engaging in real decision making when they are completing the questionnaire. While some participants may already have formed relevant intentions prior to their participation in the study, intentions as expressed in the questionnaire by other participants may just be based on a hypothetical whim. If intentions are measured before they have been formed, in the context of making a real decision, the relationship between intention and behaviour will not be as strong.

6. Also, the use of a self-reported behaviour measure may have resulted in some misclassification of individuals who misrepresented their usual reason for visiting the dentist.

The somewhat low predictive power is disappointing since intentions and its predictors were measured at the same time on the same questionnaire using similar items – conditions that should maximise predictive power. The upside however, was that the few predictors in model (i.e., the TPB model specifies three proximal determinants of intention and two proximal causes of behaviour) still explained a modest amount of the variation with the majority of the variables being significant predictors. Despite the reasons as to why predictive ability may have been compromised, the TPB appears to be a somewhat suitable framework to model patients' dental visiting behaviour, as the decision to use the dental service is made up of many influencing factors. The proximal factors such as attitudes, subjective norms, perceptions of control and self-efficacy that were examined within this model were shown to be predictive of intentions and behaviour relating to dental visiting.

6.1.3.2 Modifying intentions and behaviour

In the context of the TPB, health behavioural change is the result of reciprocal relationships between the environment, personal factors, and attributes of the behaviour itself. People's perceived control over the opportunities, resources, and skills needed to perform a behaviour affect behavioural intentions and actual performance of the behaviour. In this research, regression analyses highlighted the predictive strength of the self-efficacy and perceived control construct for dental visiting intentions and the self-efficacy construct for dental visiting behaviour. Based on these analyses, interventions should target individuals' perceptions of behavioural control when seeking to increase dental visiting intentions and promote preventive dental attendance. An approach to enhancing an individual's control over visiting the dentist would be to make changes or intervene at an environmental level. This may involve measures that increase the availability and accessibility of public dental facilities.

The results from this study can also be used in patient- and community-centred health education by identifying and enhancing the psychological features (such as self-efficacy) that characterise dental visiting behaviours. Perceptions of self-efficacy can be used to explain behavioural changes, to predict effects of interventions, and to improve dental health behaviour. In relation to dental health behaviour, self-efficacy determines whether a given behaviour is initiated (as demonstrated by the behaviour models) and for how long the behaviour may continue against any obstacles that are encountered. This is because self-efficacy beliefs provide 'the foundation for human motivation, well-being, and personal accomplishment' (Pajares, 2002). There is little incentive for individuals to carry out a behaviour, or to persevere in the face of difficulties and barriers, if they believe that the behaviour will not lead to outcomes they desire (Pajares, 2002).

In addition, the results suggest that attitudinal considerations and beliefs regarding other people's support of the behaviour also have a role to play in dental visiting intentions. Furthermore, the addition of perceived need for care to the intentions model was influential on intentions to visit the dentist, and patterns of past dental visiting behaviour when added the behaviour model appeared to influence not only visiting the dentist in the future but also the subsequent nature of the dental care sought. Effective interventions for behavioural change must therefore influence multiple levels because, as this research has demonstrated, dental health behaviour is shaped by many environmental subsystems, including family, community, beliefs, economics, and the physical and social environments in which people live. Health promotion actions should therefore be directed at strengthening the skills and capabilities of individuals, as well as changing social, environmental and economic conditions (ACT Health, 2004).

6.2 Limitations

Having looked at the main findings of this thesis research in the previous section, this section considers methodological issues. Primarily, this section addresses some of the limitations of the research design, consideration of aspects of response, measurement of the cognitive variables and the adequacy of the theoretical model.

6.2.1 Design

This was a prospective cohort study where a group of adult public dental patients were followed over time to obtain an increased understanding of what factors influence their use of services. Dental service provision, dental health behaviours, and dental beliefs, values and attitudes were examined at different points to determine the impact of these factors on dental visiting behaviour, and to determine whether or not any of these factors differed among those who attended for either emergency or general dental care. The ultimate aim was to ascertain whether seekers of emergency dental care could be characterised by particular factors and attributes. One common problem encountered in a study with this design is the loss of some participants to follow-up, which can introduce a type of selection bias. This can arise when subjects who cannot or do not complete participation are systematically different in the outcome being measured (in this case dental visiting patterns and dental beliefs, values and attitudes) compared to those who complete the study. However, because patients' records were accessed via the EXACT MIS, this limited patient involvement and so enabled the collection of data relating to service use post-baseline and post-questionnaire for the majority of participants. Unfortunately a large proportion of the sample was lost if they did not return the questionnaire, despite having data extracted on visiting behaviour post-questionnaire. The number of participants at each stage of this research (as shown in Figure 6.1), however, was still considered sufficient to show variation in the study variables and to allow analyses of the associations between variables. Potential biases introduced at the questionnaire data collection phase in terms of responders versus non-responders is discussed in Section 6.2.2. It should also be noted that, as with any study of this design, the findings cannot be generalised outside the population in which they were obtained, in this case adult public dental patients. Any attempts to generalise the results outside the study population should be made with caution.

STAGE OF STUDY	BASELINE SAMPLE STATUS: Emergency	General	Total sample
Baseline study	*n*=427	*n*=471	***n*=898**
Post-baseline follow-up *(average follow-up period of 3.0 years)*	*n*=427 (96.7%)	*n*=427 (91.5%)	*n*=844 (**94.0%**)
Questionnaire	*n*=247 (57.8%) *n*‡=243 (56.9%)	*n*=270 (57.3%) *n*‡=259 (55.0%)	*n*=517(**57.6%**) *n*‡=502 (**55.9%**)
Visited post-questionnaire *(average follow-up period of 1.2 years)*	*n*=86 (20.1%)	*n*=97 (20.6%)	*n*=183 (**20.4%**)

‡ those with matching post-baseline follow-up data

Figure 6.1: Sample attrition at the various stages of the study by baseline sample status

One may question the fact that data examining this group of patient's use of private dental services over the follow-up period were not collected. However, one of the main purposes behind following these patients was to determine their dental attendance behaviour based on a pattern of attendance *in the public sector* during the follow-up period. The questionnaire itself was designed to explain and predict dental visiting behaviour within the public sector, and so measures of intentions, attitudes, subjective norms and perceived behavioural control were derived from responses to questions relating to dental visiting within the public sector only. Consequently, by not incorporating private dental attendance into the measure of behaviour, and also because references to visiting the dentist privately were excluded from the derivation of the main components of the TPB, the resultant dataset strictly captured patients' perceptions of visiting the dentist within the public dental service and therefore eliminated as much as possible the confounding effects of visiting within the private sector, giving a clearer picture of the influential dental visiting factors specific to the public sector.

6.2.2 Responders vs. non-responders

The main advantage of self-completion questionnaires is that a large population can be surveyed, relatively cheaply. Costs are reduced because interviewers are not required and pre-coding can speed up analysis. Respondents are also free to complete questionnaires at a time convenient to them. However, there are a number of disadvantages associated with postal questionnaires. Generally the response rate is low, and even when questionnaires are completed, respondents' answers may be incomplete, illegible or incomprehensible (Newell, 1993). To ensure a high response rate, Dillman's (1978) 'Total Design Method' was employed. Dillman (1978) has found that the average response rate to a mail-based questionnaire is usually about 24%, increasing to 42% if a follow-up is conducted.

Overall few problems were encountered in the administration of the questionnaire. As is the case with most longitudinal studies, some of the participants of the research sample were lost to the analysis due to attrition (i.e., the loss of sample participants for analysis purposes). Sources of sample attrition can be classified into two categories: 1) attrition that results because of changes in the underlying population, such as death and moves interstate/overseas and 2) attrition that arises because sample participants cannot be located or because they refuse to participate (Watson and Wooden, 2004). Both types of attrition were experienced during this study. The first type of attrition is unavoidable and from a statistical viewpoint is less problematic for data analysis. The second form of attrition is potentially far more problematic. Attrition can lead to declining sample sizes that can gradually reduce the accuracy of the estimates. This is particularly a problem if this sort of attrition is non-random. If those who do not respond have characteristics that differ from those who do respond, this can lead to biased inferences. Attrition that is completely random with respect to all factors relevant to the outcome being measured leads to less precise estimates (due to the reduction of the sample size), but does not lead to biased estimates.

Although the response rate is an indicator of the potential for bias in the results of a survey, it does not indicate the actual amount of bias. The actual amount of bias can be conceptualised as a function of two factors – the amount of non-response, which is measured by a response rate, and the differences between the responders and the non-responders. A response rate does not address the latter factor. Thus, a survey with a low response rate but very little difference between responders and non-responders will have results with only a small amount of bias, whereas a survey with a relatively high response rate but a large difference between responders and non-responders will have results with a large amount of bias. These considerations should be taken into account in any interpretation of the results.

So, although a reasonably high response rate to the questionnaire (i.e., 67.9%) was achieved, it was still necessary to determine whether those who responded were representative of the total sample. Thus, in order to establish the representativeness of the sample, known characteristics of responders and non-responders were compared. Age, sex and baseline sample type (i.e., emergency or general baseline participant) were examined between responders and non-responders. The characteristics of patients who completed the questionnaire were quite similar to those of patients who did not complete the questionnaire, with no significant differences found between the proportions of responders and non-responders in terms of sex and baseline sample type (χ^2 test, $P>0.05$). The most notable difference, however, was the increased age of responders. Age differed significantly between those who responded and those who did not respond to the questionnaire, with responders being significantly older on average (55.9 years cf. 44.7 years; ANOVA, $P<0.0001$). Thus the sample of responders was not totally representative of the age distribution of the total sample. However, in multivariate regression analyses where age was controlled for, age did not come up as a significant independent predictor of intentions and behaviour. Consequently it can be assumed that no significant biases were introduced into the sample.

6.2.3 Cognitive measures

There may be the view that the cognitive measures assessed in this research may be sensitive to time lags, and to overcome this problem, one should measure the cognitive components at two time points to determine whether these measures remain stable over time. However, according to a commonly accepted view, attitudes are believed to be relatively stable and learned dispositions for decisions and behaviour (Eagly and Chaiken 1993). Given the high positive scores on the attitude scale it is unlikely that attitudes would change dramatically. What may change, however, are perceptions of control, especially if there is any restructuring to the way public oral health care is delivered, i.e., a reduction in or abolishment of co-payments, reduction in the length of the waiting lists and so forth. Public dental patients perceived these types of structural factors as barriers to visiting the dentist. In fact, these perceptions of control reflect actual control problems which are beyond the patient's control. Consequently, changes to these sorts of factors may have an effect on dental visiting intentions and future behaviour.

6.2.4 Adding to the TPB model

Although the theory of planned behaviour asserts that behaviour is determined solely by attitudes, subjective norms, and perceived behavioural control, research has shown that these variables are rarely sufficient to provide a complete account of the decision-making process, as is the case in this research, where there is still a considerable amount of the variation in intentions and behaviour unaccounted for. There is empirical evidence that supports the addition of other variables, such as intention certainty, attitudinal versus normative control, past behaviour, self-schema, and anticipated regret, to mediate the effects of intentions and behaviour (i.e., moderate the effect on the intention-behaviour and PBC-behaviour relationship) (Sheeran and Abraham, 2003). Rhodes and Courneya (2003) support the notion that the inclusion of additional concepts such as personal/moral norms, anticipated regret, self-identity, affect and personality have predictive utility in the TPB and may mediate the effect of past behaviour on current intentions and/or behaviour.

In research conducted by Gilbert, Duncan and Vogel (1998b), they found that the addition of a variable that measured the perceived need for dental care enhanced the predictive ability of their dental service utilisation model. Not perceiving a need was associated with a lower likelihood of seeking care. Of course, in some instances too, perceived need does not necessarily translate to use of services. The addition of perceived need to the intentions model in this research did in fact enhance the predictive ability of the model. It was found that those with a perceived need for dental care had greater intentions to visit the dentist, even after controlling for the TPB variables.

In this research, past dental visiting behaviour was also added to the model predicting behaviour. Although Ajzen (1991) argues that the inclusion of past behaviour in the model serves no useful purpose, as its effects should be mediated by the intentions construct, many studies have demonstrated that past behaviour does have an effect on the performance of a behaviour in the future. This perhaps indicates that there are other cognitive influences that are not accounted for by the TPB, or perhaps it's simply familiarity with a behaviour that enhances its performance in the future (Hagger et al., 2001a). For example, there is a good chance that someone with a history of emergency attendance, or similarly someone who cycles through emergency dental care, will only visit the dentist when an emergency dental problem arises. Their future dental visiting behaviour, therefore, is likely to be for an emergency appointment. In this research, it was found that those with a past pattern of emergency dental care seeking had increased odds of attending the dentist for an emergency CoC (i.e., 3.1 times the odds) and also had greater odds of reporting a problem and/or pain as their usual reason for visiting the dentist (i.e., 2.9 times the odds) when compared to those who had no previous pattern of dental attendance.

6.3 Implication of study findings

This research has identified inequities in the public dental system, disparities in oral health among emergency and general dental care patients and barriers to achieving optimal oral health for users of public dental services. These issues need to be addressed using a strategic planning approach. Unless there is a restructuring of existing public dental systems, inequities in oral health linked to socioeconomic factors will continue. Of course, the underlying cause of oral disease cannot be successfully managed by the provision of dental services alone (Watt and Sheiham, 1999). Oral health inequalities will only be reduced through effective preventive strategies and the implementation of effective and appropriate oral health promotion policies. A health promotion approach that recognises the importance of tackling the underlying social and environmental determinants of oral health is needed. These approaches need to be delivered in ways appropriate to users of public dental services.

Current policy responses have shifted from trying to change individuals' behaviour to addressing individual's concerns through approaches directed towards improving the delivery of services. Public-funded oral health programs have great potential to provide necessary preventive dental care for eligible adults but have not been able to do so in an effective and timely manner. There are many reasons for this, including the lack of integration of oral health with other public health programs and the lack of sufficient funding directed towards oral health services. As a result, state governments face a substantial challenge in trying to provide quality, appropriate, accessible public dental care services to meet all the oral health needs of eligible adults. However, the government, communities, health care providers and individuals each have a role to play in achieving the goal of optimal oral health. Improvements to oral health can be achieved by protective population and individual preventive measures as well as access to dental treatment, including specific preventive measures. In particular, emphasis should be given to upstream primary prevention rather than downstream prevention and cure (Sanders A, personal communication, April 2005).

As recommended by the Victorian Council of Social Services (VCOSS) in their state budget submission (2004–2005) concerning primary and community health, the potential strategies for improving the oral health status of disadvantaged populations include addressing:

1. Oral health inequalities and the underlying social determinants of oral health - Integrated and community-based oral health prevention programs focused on reducing the social and economic determinants of oral health inequalities need to be provided. Marino et al., (2004) evaluated the impact of a community-based oral health promotion program on the use of oral health services, oral health knowledge, attitudes and hygiene practices among Greek and Italian immigrants and observed marked improvements in these areas, as well as improvements in self-assessed general health status. Given the success of this community-based program in this particular community of adults, it may be worth considering a similar community-based oral health promotion program targeted toward adult public dental patients.

2. Dental Health - Considerable investment in social and economic infrastructure for preventive dental health services is required in order to facilitate the development and implementation of effective policies and programs directed towards ensuring that disadvantaged groups in the population have access to needed oral disease prevention and comprehensive dental services. In research conducted by Marino et al., (2005), the need to reduce structural barriers that prevented minority groups from seeking care was highlighted. One of the ways this may be done is by increasing investment in dental health through increased funding so as to 'reduce waiting times to clinically acceptable levels, achieve improved dental health

outcomes and reduce emergency dental treatment (i.e., shifting the balance between emergency, general and preventative services)'.

7 Conclusion

This research suggests that patient behaviour is, to some extent, influenced by the system but the system does not appear to respond to patients' needs. Behavioural patterns of patients reflect the structural barriers to dental care. This research has revealed that patient's dental attitudes toward their dental health and dental visiting are fairly positive, but the experience of external barriers such as the cost of dental care and waiting lists prevent them from receiving the care they need or would like. This finding moves past the individual and recognises that the system plays a vital role in the lack of access to much needed services. This in itself represents an important and useful finding, as often it is difficult to change established attitudes of people but system or structural barriers are amenable to change. McKinlay (1998) has discussed the limitations of policies that target behaviour by arguing that 'such policies: divert limited resources away from upstream health public policy; instead of a social policy approach to lifestyles; decontextualise risk behaviours and overlook the ways in which such behaviours are culturally generated and structurally maintained; seldom assess the relative contribution of nonmodifiable genetic factors and modifiable social and behavioural factors' (p77).

These findings on the use of dental services indicate that, to a large extent, the way eligible adults use public dental services is in the hands of the providers and the way the delivery system is managed.

7.1 Further research

This research has enabled a better understanding of public dental service utilisation in South Australia. It is very important to conduct regular research in order to keep up to date with any changes in the oral health needs of public dental patients. This information can then be used to develop effective oral health policies. Any commitment to improving both the oral health of adult public dental patients and the delivery of dental health services across South Australia would be enhanced by the collection of more good quality data to support sound planning and the development of prioritised needs-based health responses.

8 Appendices

Appendix A Ethical considerations

Baseline study

Approval to conduct the baseline study was granted by The University of Adelaide Human Research Ethics Committee and the South Australian Dental Service Ethics Committee.

Patients who consented to participate in the baseline study were fast-tracked through either emergency or general dental treatment to ensure that waiting time had no effect on their current oral health condition hence eliminating the potential of lag-time bias. This proved beneficial for general dental care participants as participation in the study meant they bypassed the long wait on existing waiting lists for routine care by being offered care within a month of being recruited into the baseline study.

An issue of concern with this process may be how the baseline study affected the provision of emergency and general dental care to non-participants. However, it is believed that this fast tracking of emergency and general dental care patients did not prejudice the timing of care for non-participants for the following reasons:

1. The timing of care for those requesting emergency dental care should not have been affected. Emergency patients who telephoned to obtain an appointment for emergency dental care were asked if they wanted to participate in the study, and if they refused, they were still offered emergency dental care as per usual. Generally, public dental clinics involved were only recruiting approximately 5 emergency patients for the baseline study per day so as to not disrupt the normal workday and flow of patients too much.

2. With regards to non-participants on waiting lists, there may be concern that participants in the general dental care component of the baseline study were queue-jumping, consequently causing those already waiting to be moved further down the queue for general dental care. However, at the time the baseline study

was being conducted, very few, if any, patients were being seen from the waiting list so the impact of the baseline study on the provision of general dental care to non-participants was minimal. Public dental clinics were being inundated by requests for emergency dental care leaving very few resources to provide general dental care. In fact, some of the SADS community dental clinics had 'closed' their waiting lists and were no longer taking anymore names because it was felt that it was giving people an unrealistic expectation about the possibility of obtaining general dental care.

Longitudinal follow-up and the re-contact of baseline participants

Ethical approvals

The collection of data for this thesis involved accessing clinical records and contact details of baseline participants. The SADS Board of Directors' Research and Ethics Committee gave approval to access the 'EXACT' management information system (MIS) database to obtain the contact details of baseline participants and to obtain information pertaining to subsequent dental visits and dental services received at those visits for these persons. Information collected from the 'EXACT' MIS was transcribed onto a de-personalised database. Consequently, signed consent was not sought for the collection of anonymous data from clinical records.

The University of Adelaide's Human Research Ethics Committee approved the distribution of the questionnaire entitled 'Understanding Dental Service Utilisation in South Australia - Dental Beliefs, values and attitudes' among baseline participants (Project Reference Number: H-01-2002).

Questionnaire

Structured interviews to collect information on cardholders' opinions of the public dental service were carried out in order to develop the questionnaire on public dental service use in South Australia. Patients sitting in waiting rooms of the Adelaide Dental Hospital were selected for this process. Permission to approach patients was given by SADS. The qualitative data generated from these interviews was used to assist in the development of the questionnaire.

The questionnaire was extensively pretested by ARCPOH staff and students within the Dental School, and their family and friends. Comments were invited on the structure, design and content of the questionnaire. The pretesting proved extremely useful in the development and efficacy of the questionnaire and various suggestions were incorporated into the final draft. Prior to sending out the questionnaire, the questionnaire was also piloted on a small random sample (n=30) of adult public dental patients with similar characteristics to those who participated in the baseline study. These persons were drawn from dental records of various SADS Community Dental Service clinics with the permission of the SADS CEO and Director. This exercise also proved useful and confirmed that the questionnaire functioned well. The final version of the questionnaire appears in Appendix D.

Following the successful pilot study, the questionnaire was mailed to baseline participants. A person responding to the questionnaire was considered to have given their consent to participate. An information sheet was enclosed with the questionnaire to ensure participants were able to make an informed choice regarding their participation.

Ethical issues

Various ethical issues concerning re-contacting baseline participants needed to be addressed before the follow-up study could commence.

An initial concern by SADS was in regards to the ethical issues surrounding re-contacting persons who were involved in a study up to 3½ years earlier. And secondly, if it was decided that previous participants were going to be re-contacted, the issue of who should make contact with them, i.e., researchers or SADS or both, was also raised.

The original 898 baseline participants gave consent for their baseline questionnaire data to be matched against their clinical records in EXACT on their course of care following their enrolment in the baseline study. The first ethical issue therefore related to whether SADS could provide us with subsequent courses of care across the follow-up period. By providing us with subsequent information about courses of care SADS was concerned that patient privacy would not be protected.

The second issue concerned the confidentiality of the names and contact details of those who had participated in the baseline study up to 3½ years ago. Follow-up of baseline participants was possible because records of the names of those who had participated were still in existence via signed consent forms. Contact details were not collected as part of the baseline study and therefore SADS was approached to request access to the addresses of these participants. There was, however, concern by SADS with regards to people's privacy and confidentiality. The main concern was whether or not providing the contact details of baseline participants to facilitate researchers re-contacting them would breech their privacy and the confidentially that was assured in the baseline study.

After meeting with SADS the following resolutions were made and agreements reached:

1. With regard to re-contacting baseline participants, it was decided that they should be given the option to choose whether or not they wanted to participate in a further study. As SADS recognised the importance of the research being conducted it was also decided that both researchers and SADS would be involved in re-contacting participants. As such, SADS requested that the SADS logo appear on all documents sent to baseline participants so that participants would recognise that SADS was involved just as they had been in the previous study they participated in.

2. Accessing data on subsequent courses of care was not seen to be problematic for those who consented to the next stage of the research involving a questionnaire on public dental service utilisation. By participating in the questionnaire, informed consent to have to their data on courses of care made available by SADS to the researchers was also given. However, not all participants were expected to respond to the questionnaire, so it was suggested that details of visits and services provided for all baseline participants be prepared as a unit record dataset, with each patient identified only by their baseline identification number. No names and addresses were provided. Thus, SADS would be providing a de-identified database of the clinical records extracted from the EXACT MIS database whereby the information was effectively anonymous for the purposes of maintaining client confidentiality, pending informed consent as a result of the re-approach questionnaire.

3. The researcher would undertake to prepare and maintain electronic data files on baseline participants that were stripped of personal identifiers. A master list of

baseline identification numbers and names and addresses would be separately maintained by SADS or a third party. In addition, SADS would store all hard copies of consent forms signed at baseline and completed data collection instruments which contained identifying details of baseline participants.

4. Identification of any individual person through the linkage of baseline data to the subsequent care seeking behaviour data would not be possible.

5. Adherence to rules surrounding publication, e.g., minimum cell sizes, would also be followed to ensure confidentiality.

Appendix B RNI data questions and forms

Questions used from the RNI study to establish characteristics of the baseline sample

1 Please indicate your

■ date of birth: [ ] day [ ] month [ ] year

■ sex: Male [ ]1 Female [ ]2

2 Were you born in Australia? Yes [ ]1 No [ ]2

3 Which language do you ***mainly*** speak at home? *(Please tick one box)*

English	[ ]1	Mandarin	[ ]6
Italian	[ ]2	Arabic	[ ]7
Greek	[ ]3	Russian	[ ]8
Cantonese	[ ]4	German	[ ]9
Vietnamese	[ ]5	Other *(please specify)* ______	[ ]10

4 Are you of Aboriginal and/or Torres Strait Islander origin?

- No [ ]1
- Yes, Aboriginal [ ]2
- Yes, Torres Strait Islander [ ]3

5 What is the highest level of education you have attained? *(Please tick one box)*

- Primary School [ ]1
- Some secondary school [ ]2
- Completed secondary school [ ]3
- Some University, higher education [ ]4
- Completed a University, higher education course [ ]5
- Some TAFE, CAE or vocational course [ ]6
- Completed TAFE, CAE or vocational course [ ]7
- Other [ ]8
- Don't know [ ]9

6 Do you have

- Pensioner concession card (full entitlement)? [ ]1
- Pensioner concession card (part entitlement)? [ ]2
- Health care card? [ ]3
- Veterans Affairs Card? [ ]4
- Commonwealth Seniors Health Card? [ ]5

7 Do you have private dental insurance?

- Yes [ ]1
- No [ ]2

Questions used from the RNI study to establish characteristics of the baseline sample (*continued*)

8 What category best describes your teeth? *(Please tick one box)*

- Natural teeth only ☐ 1
- Natural teeth and upper denture only ☐ 2
- Natural teeth and lower denture only ☐ 3
- Both upper and lower dentures with some natural teeth ☐ 4

9 Imagine you had an appointment to go to the dentist tomorrow, how would you feel about it? *(Please tick one box)*

- I would look forward to it as a reasonably enjoyable experience ☐ 1
- I wouldn't care one way or the other ☐ 2
- I would be a little uneasy about it ☐ 3
- I would be afraid that it would be unpleasant and painful ☐ 4
- I would be very frightened of what the dentist might do ☐ 5

10 Imagine you are waiting in the dentist's waiting room for your turn in the chair, how would you feel? *(Please tick one box)*

- Relaxed ☐ 1
- A little uneasy ☐ 2
- Tense ☐ 3
- Anxious ☐ 4
- So anxious that I sometimes break out in a sweat or almost feel physically sick ☐ 5

11 Imagine you are in the chair waiting while the dentist gets the drill ready to begin working on your teeth, how would you feel? *(Please tick one box)*

- Relaxed ☐ 1
- A little uneasy ☐ 2
- Tense ☐ 3
- Anxious ☐ 4
- So anxious that I sometimes break out in a sweat or almost feel physically sick ☐ 5

12 Imagine you are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments to be used to scrape your teeth around the gums, how would you feel? *(Please tick one box)*

- Relaxed ☐ 1
- A little uneasy ☐ 2
- Tense ☐ 3
- Anxious ☐ 4
- So anxious that I sometimes break out in a sweat or almost feel physically sick ☐ 5

13

	Very Good	Good	Fair	Poor	Very poor
How would you rate your oral health?	1	2	3	4	5

Questions used from the RNI study to establish dental visiting patterns of the baseline sample

1 What is your usual reason for visiting the dentist?

- For a regular check-up ☐1
- For an occasional check-up ☐2
- When in discomfort/pain ☐3
- When something needs to be fixed ☐4

2 How long has it been since your last dental visit? *(Please tick one box)*

Less than 12 months	☐1	3 years to less than 5 years	☐4
12 months to less than 2 years	☐2	5 years or more	☐5
2 years to less than 3 years	☐3	Never	☐6

3 Where was your last dental visit? *(Please tick one box)*

- Private practice ☐1
- Public hospital/clinic ☐2
- School Dental Service ☐3
- Dental technician ☐4
- Health Fund ☐5
- Prison, corrective/detention institution ☐6
- Other ☐7
- Don't know ☐8

4 How often do you usually go to the dentist? *(Please tick one box)*

More than 2 times a year	☐1	Once every 2 years	☐4
Two times a year	☐2	Once every 5 years	☐5
Once a year	☐3	Less often than that	☐6

RNI Oral Health Data form which collected the data used to determine the oral health status of the baseline sample ***(page 1)***

RELATIVE NEEDS INDEX SURVEY

ORAL HEALTH DATA

PATIENT'S NAME ______________________ DATE ____ / ____ / ____

STATE	CLINIC CODE	EXAMINER	RECORDER	PATIENT ID
NSW (1)				
SA (2)				

SEX	
Male	(M)
Female	(F)

COURSE OF CARE	
Emergency	(1)
General	(2)

DENTIST

	TIME SINCE GRADUATING	PRACTISING IN PUBLIC SECTOR
< 12 Months	(1)	(1)
1 - 3 Years	(2)	(2)
4 - 6 Years	(3)	(3)
7 - 9 Years	(4)	(4)
10+ Years	(5)	(5)

DENTAL PROSTHETICS

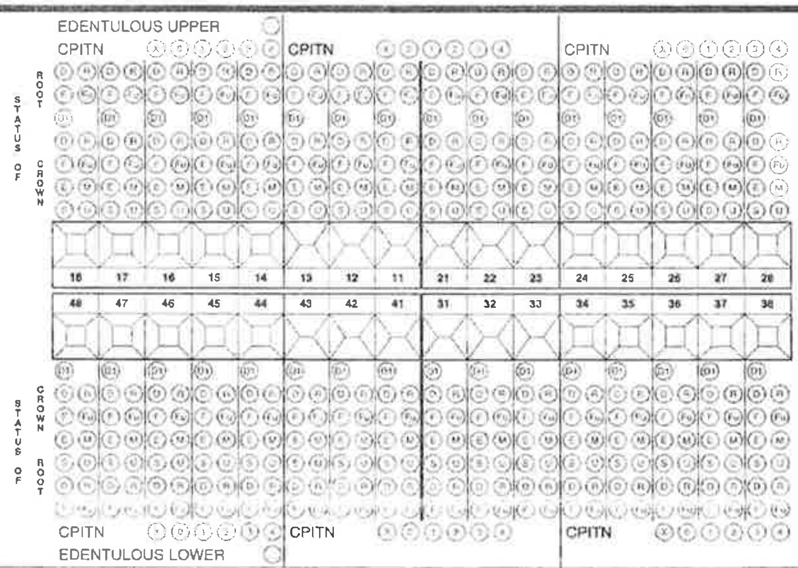
	UPPER	LOWER
Dentate		
Denture		
Hyperplasia		
Stomatitis		
Cheilitis		
Ulceration		
Other Lesion		

	UPPER	LOWER
Material		
Defects		
Retention		
Stability		
Occlusion		
Treatment Needed		

RISK ASSESSMENT

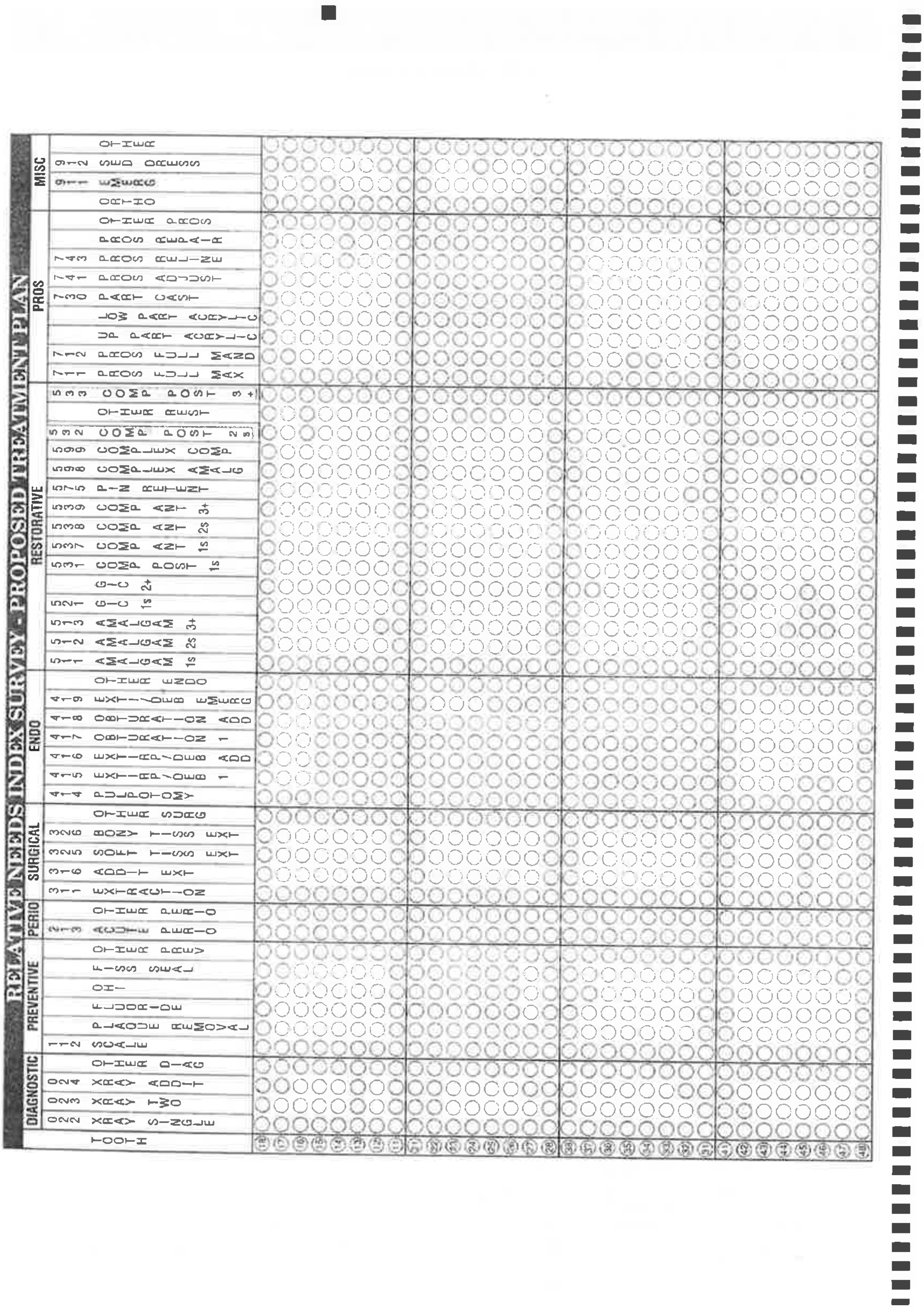
RISK STATUS OF DISEASE			
Caries	(H)	(M)	(L)
Periodontal	(H)	(M)	(L)
LIKELIHOOD OF . . .			
Completing Treatment	(H)	(M)	(L)
Complying with Preventive Advice	(H)	(M)	(L)

URGENCY OF EMERGENCY CARE		URGENCY OF GENERAL CARE	
< 48 Hours	(1)	< 1 Month	(1)
2 - 7 Days	(2)	1 - 3 Months	(2)
8 - 13 Days	(3)	4 - 6 Months	(3)
14+ Days	(4)	7+ Months	(4)



ROOTS		CROWNS			CPITN		
	D – Decayed		D1 – Precavitated decay	R – Recurrent caries		X – Excluded sextant	0 – Periodontal health
	R – Recurrent caries		D – Decayed	Fu – Filled (unsatisfactory)		1 – Gingival bleeding	2 – Calculus
	F – Filled		F – Filled	M – Missing / Other		3 – Pocket 4-5mm	4 – Pocket 6mm or more
	Fu – Filled (unsatisfactory)		E – Extracted (caries/perio)	U – Unerupted			
			S – Sound				

RNI Oral Health Data form which collected the data used to determine the oral health status of the baseline sample ***(page 2)***



RNI service provision data form which collected the data used to determine the service-mix of the baseline sample *(page 1)*

RELATIVE NEEDS INDEX STUDY

SERVICE PROVISION DATA

CLINIC CODE: ______ PATIENT CODE: ____________

PATIENT'S NAME: ______________________________

Date of Visit	Tooth Number	Treatment/Services Provided (ADA codes)

RNI service provision data form which collected the data used to determine the service-mix of the baseline sample *(page 2)*

EXAMPLE

Column A	**Date of Visit**	Use as one would a day book so that date is lined up with the services provided on that day
Column B	**Tooth Number**	If service provided is applicable to a particular tooth then use the FDI code to identify that tooth, else use NA
Column C	**Services Provided**	All services whether consultative or treatment should be listed using the ADA codes

Date of Visit	**Tooth Number**	**Treatment/Services Provided (ADA code numbers)**
3.7.99	NA	011, 023, 112
10.7.99	16	513
	15	521
17.7.99	38	311

Appendix C Cover letters sent to baseline sample

Primary approach letter

South Australian
Dental Service

ARCPOH
Australian Research Centre for
POPULATION ORAL HEALTH

THE UNIVERSITY
OF ADELAIDE
AUSTRALIA

DENTAL SCHOOL
FACULTY OF HEALTH SCIENCES

LIANA LUZZI
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FACSIMILE +61 8 8303 4858
liana.luzzi@adelaide.edu.au

Monday, 2 June 2003

«Title» «First_name» «Surname»
«ADDRESS»
«SUBURB» «State» «PCODE»

Dear «Title» «Surname»,

The University of Adelaide, in collaboration with the South Australian Dental Service (SADS), is conducting a study on the use of public dental services in South Australia. This is a follow-up to the 'Relative Needs Index' (RNI) study which you kindly participated in three years ago.

As a valued participant in the RNI study we have selected you again to ask for your assistance in this follow-up study. Within the next week you will receive a request in the mail to complete a questionnaire. The main purpose of the study is to gain information on the current use of public dental services in South Australia. We are also interested in your opinions and experiences in relation to using public dental services.

Your participation in the follow-up study will make a significant contribution to better understanding public dental service use in South Australia and will assist us in finding ways to improve services provided at public dental clinics.

We would greatly appreciate your taking the time necessary to complete and return the questionnaire when it arrives.

Thank you in advance for your help.

Yours sincerely,

Ms Liana Luzzi
Researcher

Initial mailing of questionnaire

South Australian Dental Service

ARCPOH
Australian Research Centre for POPULATION ORAL HEALTH

THE UNIVERSITY OF ADELAIDE AUSTRALIA

DENTAL SCHOOL
FACULTY OF HEALTH SCIENCES

LIANA LUZZI
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FACSIMILE +61 8 8303 4858
liana.luzzi@adelaide.edu.au

Monday, 9 June 2003

«Title» «First_name» «Surname»
«ADDRESS»
«SUBURB» «State» «PCODE»

Dear «Title» «Surname»,

The University of Adelaide, in collaboration with the South Australian Dental Service (SADS), is conducting research on the use of public dental services in South Australia as a follow-up to a study called the 'Relative Needs Index' (RNI) which you may remember participating in three years ago.

Your participation in the RNI study has been greatly appreciated and your contribution has been of great value. The information you provided for this study has enabled us to better understand the treatment needs of adults attending public dental service clinics. We could not have done this without your help.

As a valued participant in the RNI study your assistance is now being sought for this follow-up study. Participation in this study involves completing the enclosed questionnaire called '*Understanding Public Dental Service Utilisation in South Australia*' and returning it in the reply paid envelope provided. In order to obtain a representative view of the issues surrounding public dental service use in SA it is important that each person in the study completes and returns the questionnaire.

By choosing to participate you will be making a significant contribution to better understanding public dental service use in South Australia. The information you provide will assist us in finding ways to improve services provided at public dental clinics.

An information sheet providing more details about the study and the questionnaire is also enclosed. Responses to the questionnaire are strictly confidential and will only be used by the researchers at The University of Adelaide. The results published from the study will not include your name or any information that could identify you.

Your time to fill in the questionnaire and return it in the reply paid envelope provided would be appreciated. If you have any questions about the study or the questionnaire, please do not hesitate to contact me on (08) 8303 4049.

Many thanks,

Ms Liana Luzzi
Researcher

Reminder card

South Australian
Dental Service

ARCPOH
Australian Research Centre for
POPULATION ORAL HEALTH

THE UNIVERSITY
OF ADELAIDE
AUSTRALIA

A friendly reminder…

A short time ago you should have received a questionnaire and an information sheet about the questionnaire asking you to participate in a study called '*Understanding Public Dental Service Utilisation in South Australia*'.

Your participation will make a significant contribution to better understanding public dental service use in South Australia and will assist us in finding ways to improve services provided at public dental clinics.

If you have already returned the questionnaire, please accept our thanks and ignore this notice. If not, please take the time to fill it in and post it back to us today in the reply paid envelope provided.

If by some chance you did not receive this questionnaire, or it has been misplaced, or you have any questions about the study or the questionnaire, please contact me on (08) 8303 4049.

Many thanks,

Ms Liana Luzzi
Researcher
Dental School, The University of Adelaide

Follow-up mailing 1

South Australian Dental Service

ARCPOH
Australian Research Centre for POPULATION ORAL HEALTH

THE UNIVERSITY OF ADELAIDE AUSTRALIA

DENTAL SCHOOL
FACULTY OF HEALTH SCIENCES

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Monday, 14 July 2003

«Title» «First_Name» «Surname»
«No__Street»
«Suburb» «State» «Postcode»

Dear «Title» «Surname»,

I recently wrote to you seeking your views and experiences in relation to using public dental services in South Australia as part of a research study to obtain an understanding of public dental service use in this state. As of today we have not yet received your completed questionnaire. We realise that you may not have had time to complete it. However, we would genuinely appreciate hearing from you. If you have recently returned your questionnaire, please accept our thanks and ignore this letter.

The University of Adelaide and the South Australian Dental Service (SADS) has undertaken this study because of the need to obtain a better understanding of the issues surrounding public dental service use in South Australia. Understanding the factors that influence dental attendance is crucial to improving dental health outcomes.

You were chosen to participate in this study on the basis of your involvement in the 'Relative Needs Index' (RNI) study which you kindly participated in three years ago. This research is being done as a follow-up to the RNI study so I am writing to you again because of the significance each questionnaire has to the usefulness of this study.

By providing us with information on how you use the dental service and by sharing your opinions and experiences in relation to using the dental service, it will enable us to gain a better understanding of current dental service use in South Australia. This information will then be used to assist us in finding ways to improve services provided at public dental clinics.

In the event that your questionnaire has been misplaced, a replacement has been enclosed. If you have any questions about the study or the questionnaire, please do not hesitate to contact me on (08) 8303 4049.

Your contribution to the success of this study will be greatly appreciated.

Yours sincerely,

Ms Liana Luzzi
Researcher

Follow-up mailing 2

South Australian Dental Service

ARCPOH
Australian Research Centre for POPULATION ORAL HEALTH

THE UNIVERSITY OF ADELAIDE AUSTRALIA

DENTAL SCHOOL
FACULTY OF HEALTH SCIENCES

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Monday, 1 September 2003

«Title» «First_Name» «Surname»
«No__Street»
«Suburb» «State» «Postcode»

Dear «Title» «Surname»,

I am writing to you about our study on the use of public dental services in South Australia. We have not yet received your completed questionnaire. We understand that you may not have had time to complete it. However, it is not too late to participate in the study and we would genuinely appreciate hearing from you. If you have recently returned your questionnaire, please accept our thanks and ignore this letter.

The number of questionnaires returned so far is very encouraging. But, whether we will be able to describe accurately the issues surrounding public dental service use in South Australia depends upon you and the other individuals who have not yet responded.

This study on public dental service utilisation is important to the provision of effective and efficient dental care by the South Australian Dental Service (SADS). The study provides an opportunity for you to tell us about your experiences with the public dental service so we can develop a better understanding of factors that influence dental service use. The information you share with us will assist us in finding ways to improve services provided to you and others at public dental clinics.

In the event that our previous correspondence did not reach you, or the questionnaire has been misplaced, a replacement is enclosed. Please take the time to complete and return the questionnaire as soon as possible.

If you have any questions about the study or the questionnaire, please do not hesitate to contact me on (08) 8303 4049.

Your contribution to the success of this study will be greatly appreciated.

Yours sincerely,

Ms Liana Luzzi
Researcher

Appendix D TPB questionnaire

Information sheet

South Australian Dental Service

ARCPOH Australian Research Centre for POPULATION ORAL HEALTH

THE UNIVERSITY OF ADELAIDE AUSTRALIA

INFORMATION ABOUT THE QUESTIONNAIRE

The University of Adelaide, in collaboration with the South Australian Dental Service (SADS), is conducting research on the use of public dental services in South Australia. We are interested in obtaining information about your experiences with the public dental service so we can continue to find ways to improve the service you receive at public dental clinics. Your participation in this study will make a significant contribution to understanding public dental service use in South Australia. Understanding the factors that influence dental attendance is crucial to improving dental health outcomes.

What is involved?

The accompanying questionnaire contains questions about you, your opinions with regard to the public dental service and your pattern of dental visits. If you choose to take part in the study, you are asked to complete the questionnaire and return it in the reply paid envelope. By returning the questionnaire, you will also be giving permission to the researchers to obtain information about your dental visits from the SADS Community Dental Service clinic that you have attended. The information would be issued by SADS staff and will be confined to the records of your dental health status and types of dental care provided to you. No information about your medical history or other aspects of care outside your dental treatment will be forwarded to the researchers.

Your participation in this study is voluntary. As a participant in the study, you have the right to withdraw from the study at any time without it affecting your entitlements to dental care now or in the future.

How were you selected?

A while ago you were involved in a study called 'Relative Needs Index' (RNI) conducted at your SADS Community Dental Service clinic. You have been selected to participate in this study on the basis of your involvement in the RNI study.

Confidentiality

All information collected for the study will be strictly confidential. Only researchers will have access to your answers, and the results published from the study will not include your name or any information that could identify you.

Who are the researchers?

The study is being conducted by Ms Liana Luzzi as part of a higher degree project at The University of Adelaide. Her supervisors are Professor John Spencer and Dr Kaye Roberts-Thomson. If you wish to discuss any aspects of the study with them, they can be contacted on (08) 8303 4049.

Researchers will be happy to answer any questions you have about the study and/or your participation. A sheet containing information on who to contact in case you wish to make a complaint, raise any concerns or obtain any additional information on the project is also provided overleaf. Thank you for your assistance.

THE UNIVERSITY OF ADELAIDE AUSTRALIA

CONTACTS FOR FURTHER INFORMATION ON PROJECT AND INDEPENDENT COMPLAINTS PROCEDURE

The Human Research Ethics Committee is obliged to monitor approved research projects. In conjunction with other forms of monitoring it is necessary to provide an independent and confidential reporting mechanism to assure quality assurance of the institutional ethics committee system. This is done by providing you with an additional avenue for raising concerns regarding the conduct of any project in which you are involved.

The following study has been reviewed and approved by The University of Adelaide Human Research Ethics Committee:

Project Title: **Understanding Public Dental Service Utilisation in South Australia**

1. If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should contact the project coordinator:

   Name: Ms Liana Luzzi Telephone: (08) 8303 4049

2. If you wish to discuss with an independent person matters related to

   - making a complaint, or
   - raising concerns on the conduct of the project, or
   - The University policy on research involving human subjects, or
   - your rights as a participant

   contact the Human Research Ethics Committee's Secretary on (08) 8303 4014.

Questionnaire

South Australian Dental Service

ARCPOH
Australian Research Centre for POPULATION ORAL HEALTH

THE UNIVERSITY OF ADELAIDE AUSTRALIA

Understanding Public Dental Service Utilisation in South Australia

Dental beliefs, values and attitudes

Ms Liana Luzzi
ARCPOH - Dental School
The University of Adelaide
SOUTH AUSTRALIA 5005

Telephone: (08) 8303 4049
Facsimile: (08) 8303 4858

SECTION 1

The questions in this section will help us to understand your use of public dental services. Please tick the boxes or write responses, where appropriate, in the spaces provided.

1 Please indicate your date of birth. ____ / ____ / ____ (day / month / year)

2 What is your sex?
- ☐1 Male
- ☐2 Female

3 Are you covered by any Government Health Concession cards?
- ☐1 Yes ⟶ Please go to Q4
- ☐2 No ⟶ Please go to Q5

4 Which Government Health Concession card(s) are you covered by?

Please tick one or more boxes ☑
- ☐1 Pensioner Concession Card
- ☐2 Health Care Card
- ☐3 Department of Veterans Affairs Card
- ☐4 Commonwealth Seniors Card

5 Do you have private dental insurance?
- ☐1 Yes
- ☐2 No

6 What is your usual reason for visiting the dentist?

Please tick one or more boxes ☑
- ☐1 For a regular check-up
- ☐2 For an occasional check-up
- ☐3 When in discomfort/pain
- ☐4 When something needs to be fixed

7 How long has it been since your last dental visit (private or public)?

Please tick one box ☑
- ☐1 Less than 1 year
- ☐2 1 year to less than 2 years
- ☐3 2 years to less than 3 years
- ☐4 3 years to less than 5 years
- ☐5 5 years or more

8 Where was your last dental visit?

Please tick one box ☑
- ☐1 Private practice
- ☐2 Public hospital/clinic
- ☐3 Dental technician
- ☐4 Health Fund
- ☐5 Other

9 How often do you usually go to the dentist?

Please tick one box ☑
- ☐1 More than 2 times a year
- ☐2 Two times a year
- ☐3 Once a year
- ☐4 Once every 2 years
- ☐5 Once every 5 years
- ☐6 Less often than that

10	What was the nature of your last dental visit? ▪ Please tick one box ☑	☐1 Check-up ☐2 Relief of pain ☐3 Dental problem not involving pain ☐4 Other *(please specify)*
11	How would you rate your ***general health***? ▪ Please tick one box ☑	☐1 Excellent ☐2 Very good ☐3 Good ☐4 Fair/Average ☐5 Poor ☐6 Very poor
12	How would you rate your ***oral health***? ▪ Please tick one box ☑	☐1 Excellent ☐2 Very good ☐3 Good ☐4 Fair/Average ☐5 Poor ☐6 Very poor
13	Do you have any of your own natural teeth? ▪ NATURAL teeth does ***not*** include dentures.	☐1 Yes – have some or all natural teeth ☐2 No – lost all natural teeth
14	Do you think that you need to make a dental visit now?	☐1 Yes ☐2 No ☐3 Don't know
15	What dental treatment do you think you currently need? ▪ Please tick one or more boxes ☑	☐1 None ☐2 Check-up ☐3 Cleaning and scaling of teeth ☐4 Dental fillings(s) ☐5 Extraction(s) ☐6 New or replacement dentures ☐7 Denture repair ☐8 Gum treatment ☐9 Dental crown or bridge ☐10 Other *(please specify)*
16	Are you currently receiving dental treatment?	☐1 Yes ☐2 No

SECTION 2

HOW TO ANSWER THE QUESTIONS

The items in this section refer to various dental beliefs, values and attitudes regarding visiting a dentist in a SADS public dental clinic or hospital for either a check-up, a dental problem (with or without pain) or for any other reason.

Please read each item carefully and then circle only ***one*** response that most closely corresponds to your views.

Example:

I intend to visit the dentist.	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely

There are no right or wrong answers. We just want your opinion/views about using the public dental service. Therefore please respond to each item in this section in terms of ***your views about and experiences with the public dental service.***

A The following items refer to your intentions about visiting the dentist. Please circle only ***one*** response category to indicate your intention.

NB. *If you are currently receiving treatment or have recently completed treatment, please answer the following items in terms of what your intentions are with regards to visiting the dentist in the future.*

A1	I ***want*** to visit the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
A2	I ***plan*** to visit the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree

B Each of the following items begins with "If I were to visit the dentist I expect that…". Please circle ***one*** response only to indicate your level of agreement/disagreement with EACH item.

If I were to visit the dentist I expect that...

B1	...there would be long waiting lists.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
B2	...dental treatment would be costly.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
B3	...I would have to pay a gap (i.e., a co-payment)	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
B4	...I would have a bad dental experience.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
B5	...I would not have a choice of dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
B6	...I would be afraid about my dental visit.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
B7	...I would be anxious about my dental visit.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
B8	...the dental clinic would not be conveniently located.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree

C Each of the following items begins with "I think that by visiting the dentist I will...". For each item, please circle only ***one*** response category.

I think that by visiting the dentist I will...

C1	...prevent decay in my teeth?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C2	...keep my teeth healthy?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C3	...prevent future problems with my teeth, mouth or dentures?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C4	...keep my teeth looking good?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C5	...prevent pain in my teeth, mouth or dentures?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C6	...have good oral health?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C7	...receive preventive dental treatments?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C8	...have my teeth cleaned?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C9	...receive fillings to fix dental decay?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C10	...receive unnecessary extractions?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C11	...prevent loss of teeth?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C12	...receive dental advice from a dental professional?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C13	...get my dental problem/s fixed if there were any problems to be fixed?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C14	...have to wait a long time in the waiting room for my appointment?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C15	...experience painful dental treatment?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C16	...be seen promptly?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C17	...be afraid about my dental visit?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
C18	...be anxious about my dental visit?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely

D The following items relate to your opinion about various dental beliefs, values and attitudes. For each item, please circle only ***one*** response category that most closely corresponds to your opinion.

D1	Preventing tooth decay is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D2	Keeping my teeth healthy is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D3	Preventing future problems with my teeth, mouth or dentures is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D4	Keeping my teeth looking good is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D5	Preventing pain in my teeth, mouth or dentures is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D6	Good oral health is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D7	Receiving preventive treatments is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D8	Having my teeth cleaned is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D9	Receiving fillings to fix dental decay is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D10	Preventing tooth loss is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D11	Receiving dental advice from a dental professional is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D12	Getting my dental problem/s fixed if there were any problems to be fixed is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important
D13	Being seen promptly is...	Extremely unimportant	Quite unimportant	Slightly unimportant	Neither unimportant or important	Slightly important	Quite important	Extremely important

D14	Receiving unnecessary extractions is...	Extremely bad	Quite bad	Slightly bad	Neither bad or good	Slightly good	Quite good	Extremely good
D15	Painful dental treatment is...	Extremely bad	Quite bad	Slightly bad	Neither bad or good	Slightly good	Quite good	Extremely good
D16	Waiting a long time in the waiting room for my appointment is...	Extremely bad	Quite bad	Slightly bad	Neither bad or good	Slightly good	Quite good	Extremely good
D17	Being afraid about my dental visit is...	Extremely bad	Quite bad	Slightly bad	Neither bad or good	Slightly good	Quite good	Extremely good
D18	Being anxious about my dental visit is...	Extremely bad	Quite bad	Slightly bad	Neither bad or good	Slightly good	Quite good	Extremely good

E The next block of items relate to various things that could have an impact upon whether or not you visit the dentist. Please answer the question "*How difficult or easy <u>for you</u> would the following factors make visiting the dentist?*" in relation to EACH item listed by circling ***one*** response only to indicate the level of ease/difficulty you associate with EACH item.

How difficult or easy <u>for you</u> would the following factors make visiting the dentist?

E1	Long waiting lists	Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy
E2	Costly dental treatment	Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy
E3	Having to pay a gap (i.e., co-payments)	Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy
E4	Not having your choice of dentist	Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy
E5	Convenient location of the dental clinic	Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy
E6	Having to pay for dental treatment, regardless of the amount	Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy

For items E7–E9, please read carefully and answer accordingly.

E7 Thinking back to your past dental visits, have you ever had any bad dental experiences?

☐1 No → Please go to **E8**

☐2 Yes → How difficult or easy do bad past dental experiences make visiting the dentist now?

Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy

E8 Are you afraid of going to the dentist?

☐1 No → Please go to **E9**

☐2 A little

☐3 Yes,quite

☐4 Yes, very

→ How difficult or easy does being dentally afraid make visiting the dentist?

Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy

E9 Are you anxious about going to the dentist?

☐1 No → Please go to **Section F**

☐2 Yes → How difficult or easy does being dentally anxious make visiting the dentist?

Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy

F The following items refer to what you think people who are important to you (e.g., family, friends etc.) would want you to do in relation to you visiting the dentist. For each item, please circle only ***one*** response category.

F1	People who are important to me think that *I should* visit the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
F2	People who are important to me *would approve* of me visiting the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
F3	People who are important to me *want me to* visit the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree

G The next 2 items refer to whether or not people who are important to you visit the dentist. For each item, please circle only ***one*** response category.

G1	Most people who are important to me visit the dentist.	Completely false	Quite false	Slightly false	Neither false or true	Slightly true	Quite true	Completely true
G2	The people in my life whose opinion I value visit the dentist.	Completely false	Quite false	Slightly false	Neither false or true	Slightly true	Quite true	Completely true

H The following items refer to what you think various people in your life would want you to do in relation to you visiting the dentist. Please answer the question "*To what extent would the following people disapprove or approve of you visiting the dentist?*" by circling ***one*** response only to indicate their level of approval/disapproval in relation to you visiting the dentist.

To what extent would the following people disapprove or approve of you visiting the dentist?

H1	Your family	Strongly disapprove	Moderately disapprove	Slightly disapprove	Neither disapprove or approve	Slightly approve	Moderately approve	Strongly approve	Not applicable
H2	Your partner	Strongly disapprove	Moderately disapprove	Slightly disapprove	Neither disapprove or approve	Slightly approve	Moderately approve	Strongly approve	Not applicable
H3	Your parent/s	Strongly disapprove	Moderately disapprove	Slightly disapprove	Neither disapprove or approve	Slightly approve	Moderately approve	Strongly approve	Not applicable
H4	Your mother	Strongly disapprove	Moderately disapprove	Slightly disapprove	Neither disapprove or approve	Slightly approve	Moderately approve	Strongly approve	Not applicable
H5	Your friend/s	Strongly disapprove	Moderately disapprove	Slightly disapprove	Neither disapprove or approve	Slightly approve	Moderately approve	Strongly approve	Not applicable

I The next few items in this section seek your opinion about whether or not you would like to do what people important to you want you to do. Please circle a number from 1 (Not at all) to 7 (Very Much) to indicate how much you would like to do what others think you should do.

I1	Generally speaking, I would like to do what my family thinks that I should do.	Not at all	1	2	3	4	5	6	7	Very Much	Not applicable
I2	Generally speaking, I would like to do what my partner thinks that I should do.	Not at all	1	2	3	4	5	6	7	Very Much	Not applicable
I3	Generally speaking, I would like to do what my parent/s thinks that I should do.	Not at all	1	2	3	4	5	6	7	Very Much	Not applicable
I4	Generally speaking, I would like to do what my mother thinks that I should do.	Not at all	1	2	3	4	5	6	7	Very Much	Not applicable
I5	Generally speaking, I would like to do what my friend/s thinks that I should do.	Not at all	1	2	3	4	5	6	7	Very Much	Not applicable

Please note that in part J the response options for each item are DIFFERENT so please read each item carefully before answering.

J The following items relate to your opinion about visiting the dentist. For each item, please circle only ***one*** response category.

J1	My visiting the dentist would be...	Extremely harmful	Quite harmful	Slightly harmful	Neither harmful or beneficial	Slightly beneficial	Quite beneficial	Extremely beneficial
J2	My visiting the dentist would be...	Extremely unpleasant	Quite unpleasant	Slightly unpleasant	Neither unpleasant or pleasant	Slightly pleasant	Quite pleasant	Extremely pleasant
J3	My visiting the dentist would be...	Extremely worthless	Quite worthless	Slightly worthless	Neither worthless or worthwhile	Slightly worthwhile	Quite worthwhile	Extremely worthwhile
J5	For me to visit the dentist from now on would be...	Extremely difficult	Quite difficult	Slightly difficult	Neither difficult or easy	Slightly easy	Quite easy	Extremely easy
J6	What is the likelihood of you visiting the dentist from now on?	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither unlikely or likely	Slightly likely	Quite likely	Extremely likely
J7	It is mostly up to me whether I visit the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
J8	Whether or not I visit the dentist is entirely up to me.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
J9	I have complete control over whether or not I visit the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree
J10	There are factors outside my control that could prevent me from visiting the dentist.	Strongly disagree	Moderately disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Moderately agree	Strongly agree

SECTION 3

The items in this section refer to various situations, feelings, and reactions related to dental treatment. Please rate your feelings or beliefs on these items by *circling* the number (1, 2, 3, 4, or 5) of the category which most closely corresponds to your views about dentists in general.

		Never	A little	Some-what	Often	Nearly always
(a)	I do not think dentists like it when a patient makes a request.	1	2	3	4	5
(b)	Dentists are efficient but it often seems like they are in a hurry, so I feel rushed.	1	2	3	4	5

	When having dental work done...	Never	A little	Some-what	Often	Nearly always
(c)	I trust the dentist to do what is best for me.	1	2	3	4	5
(d)	I feel that dentists do not provide clear explanations.	1	2	3	4	5
(e)	The dentist is understanding of my needs.	1	2	3	4	5
(f)	The dentist displays concern for me as person.	1	2	3	4	5
(g)	I feel that dentists do not really listen to what I say.	1	2	3	4	5
(h)	I feel the dentist will do what he/she wants, no matter what I might say I want.	1	2	3	4	5
(i)	Dental professionals say things to make me feel guilty about the way I care for my teeth.	1	2	3	4	5
(j)	Dentists are truthful about the work that is needed.	1	2	3	4	5
(k)	I think that dentists say things in a way to try and fool me.	1	2	3	4	5
(l)	I feel that dentists do not take my worries (fears) seriously.	1	2	3	4	5
(m)	I feel dentists put me down (make light of my fears).	1	2	3	4	5
(n)	I worry if dentists are technically competent to do a quality job.	1	2	3	4	5
(o)	If I were to indicate that it hurts, I don't think the dentist will stop and try to correct the problem.	1	2	3	4	5
(p)	When I am in the chair I don't feel like I can stop the appointment for a rest if I feel the need.	1	2	3	4	5
(r)	I do not feel comfortable asking questions.	1	2	3	4	5
(s)	The thought of "hearing bad news" is enough to keep me from going to the dentist.	1	2	3	4	5
(t)	The thought of receiving all the necessary dental work discourages me from going to the dentist.	1	2	3	4	5

SECTION 4

The following questions ask about your dental behaviours. Please write the *number of times per day* that you perform the following dental behaviours. If you do not perform a particular behaviour, write 'nil' in the space corresponding to that behaviour.

	On a usual day, how many times do you...	NUMBER OF TIMES PER DAY
(1)	...**brush** your teeth?	_______
(2)	...use a **mouth rinse** or mouth wash?	_______
(3)	...clean **between** your teeth (using dental floss, tape, or interdental brush/pick/stick)?	_______

Comments

The following lines are for any comments you wish to make about the questionnaire or about your experiences with the public dental service in general.

____

____

____

____

____

____

____

____

Thank you...

Thank you for completing this questionnaire and for sharing your beliefs, values and opinions about the public dental service with us. Your assistance in completing this questionnaire is greatly appreciated and your contribution is valued.

Please return your completed questionnaire in the enclosed reply-paid envelope addressed to:
ARCPOH - Dental School
The University of Adelaide
SOUTH AUSTRALIA 5005

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