

The quality, type and time spent in child care in the first three years of life and children's cognitive and socio-emotional development at school entry

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Abstract

Background: Evidence from decades of research suggests that children's experiences before starting school are crucial foundations for learning and behaviour across the life course. During the preschool years, children spend a large proportion of their time both in the family home and in the non-parental child care environment. The family home and non-parental child care settings are the key caregiving environments where infants and toddlers learn and build healthy relationships prior to commencing school. Previous research, mainly from the USA, suggests that the type, time and quality of child care influences children's development, but there is little or no information describing the effects of these different aspects of child care on children's development within the Australian context.

Aim: The overarching aim of this thesis was to investigate the association between the type, time and quality of child care experienced by infants (0-1 years) and toddlers (2-3 years) and these children's cognitive (receptive vocabulary, task attentiveness, academic literacy and maths proficiency) and socio-emotional development (emotional regulation, internalising and externalising behaviours) when they started school (aged 4-5 and 6-7). Specifically the aims were:

- To determine whether the total amount of time spent in child care through the first three years of life was associated with children's cognitive and socio-emotional development at age 4-5 years and whether this association varied according to the primary type of child care;
- To determine whether the quality of formal child care at age 2-3 years was associated with children's cognitive and socio-emotional development at age 4-5 and 6-7 years;

- To establish if higher quality child care was associated with better cognitive and socio-emotional outcomes at school entry for children from lower compared to higher income families.

Method: Data for this thesis were drawn from the Longitudinal Study of Australian Children, a national study following the health and development of a population-representative sample of children recruited in their first year of life (age range 3 to 19 months). The analytic approaches to answer the aims of this thesis included multiple imputation, regression, propensity score matching, effect measure modification, and the absolute and relative slope differences within strata of income.

Results: In the first study, more time in child care through the first three years of life was not associated with children's receptive vocabulary ability but was associated with higher levels of parent-reported and teacher-reported externalising problem behaviours and lower levels of parent-reported internalising problem behaviours at age 4-5 years. These effects were concentrated among children who experienced predominately centre-based child care.

In the second study, the quality of relationships in formal child care at age 2-3 years was associated with children's task attentiveness, emotional regulation, receptive vocabulary, literacy and maths proficiency, internalising and externalising behaviours at age 4-5 years, and these effects, although weaker, continued to exert their influence at age 6-7 years after two years of formal schooling. The quality of activities in formal child care was only associated with children's emotional regulation and there was no evidence that provider or program characteristics of care were associated with children's developmental outcomes.

In the third study, after adjusting for confounding, there was some evidence of effect measure modification on the additive and multiplicative scales of child care quality by income. Specifically, higher quality child care, in terms of relationships with child care providers, was more strongly associated with better cognitive and socio-emotional

outcomes among children from lower income than those from higher income families, suggesting that higher quality child care matters more for lower income children.

Conclusions: Findings from this thesis present the first comprehensive, longitudinal analysis of the type, time and quality of child care on children's development using a nationally representative sample of children relevant to the Australian experience. The findings are consistent with overseas research showing that child care may influence children's development in both positive and negative ways. Most notably, these findings suggest that higher quality relationships in child care support children's positive cognitive and socio-emotional development at school entry, particularly in relation to children from disadvantaged backgrounds.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other institution and affirms that to the best of my knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of thesis. In addition, I certify that no part of this work will, in the future be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Signed.....

Angela Gialamas (Candidate)

Date:06/07/2015.....

Publications contributing to this thesis

- Gialamas A, Mittinty MN, Sawyer MG, Zubrick SR, Lynch J. Child care quality and children's cognitive and socio-emotional development: an Australian longitudinal study. *Early Child Development and Care* 2014; 184(7):1-21.
- Gialamas A, Sawyer ACP, Mittinty MN, Zubrick SR, Sawyer MG, Lynch J. Quality of child care influences children's attentiveness and emotional regulation at school entry. *The Journal of Pediatrics* 2014; 165(4):813-819.
- Gialamas A, Mittinty MN, Sawyer MG, Zubrick SR, Lynch J. Time spent in different types of child care and children's development at school entry: an Australian longitudinal study. *Archives of Disease in Childhood* 2015; 100(3):226-232.
- Gialamas A, Mittinty MN, Sawyer MG, Zubrick SR, Lynch J. Social inequalities in child care quality and their effects on children's development at school entry: findings from the Longitudinal Study of Australian Children. *Journal of Epidemiology and Community Health* 2015 doi:10.1136/jech-2014-205031.

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- Gialamas A, Sawyer, ACP, Mittinty MN, Zubrick SR, Sawyer MG, Lynch J. Quality of child care influences children's attentiveness and emotional regulation at school entry. Public Health Association of Australia (South Australia Branch) State Population Health Conference, Adelaide, October 2014.
- Gialamas A, Mittinty MN, Sawyer MG, Zubrick SR, Lynch J. Time spent in different types of child care and children's cognitive and socio-emotional development at school entry. School of Population Health Seminar Series, Adelaide, November 2013.
- Gialamas A, Mittinty MN, Sawyer MG, Zubrick SR, Lynch J. Time in child care and children's cognitive and socio-emotional development at school entry. Public Health Association of Australia (South Australia Branch) State Population Health Conference, Adelaide, October 2013.
- Gialamas A, Mittinty MN, Sawyer MG, Zubrick SR, Lynch J. Quality of child care and children's cognitive and socio-emotional development. School of Population Health Seminar Series, Adelaide, September 2012.

- Gialamas A, Mittinty MN, Sawyer MG, Zubrick SR, Lynch J. Quality of non-parental child care and children's receptive vocabulary and academic achievement at age 4-5 and 6-7 years. The University of Adelaide, Faculty of Health Sciences Postgraduate Research Conference, Adelaide, August 2012.
- Gialamas A, Lynch J, Mittinty MN, Sawyer MG, Zubrick SR. Can we develop a measure to define the quality of non-parental child care which predicts children's receptive vocabulary and social-emotional outcomes? 12th Australian Institute of Family Studies Conference: Family Transitions and Trajectories, Melbourne, Australia, July 2012.
- Gialamas A, Mittinty MN, Sawyer MG, Zubrick SR, Lynch J. Does the type, quality and time spent in child care influence children's cognitive and social development? School of Population Health Seminar Series, Adelaide, September 2011.

Coverage of findings arising from this thesis

- “Day care is more than child’s play”, Daily Telegraph, Sydney, 6 September 2014.
- Radio interview, “Quality child care makes quality children”, 2SER Radio, New South Wales, 04 September 2014.
- “Good relationships: good beginnings”, EarlyChildhood Australia WebWatch #195, 03 September 2014.
- Radio interview, “Quality of child care influences children’s attentiveness and emotional regulation at school entry”, Radio Adelaide, Adelaide, 29 August 2014.
- “Child care, emotional security linked”, Campus Review, 27 August 2014.
- “Best care helps move to school”, The Advertiser, Adelaide, 26 August 2014, pg 15.
- “High-quality childcare helps kids be more attentive and better deal with their emotions, study shows”, The Australian, Australia, 26 August 2014.
- “High-quality childcare helps kids be more attentive and better deal with their emotions, study shows”, Herald Sun, Victoria, 26 August 2014.
- “High-quality childcare helps kids be more attentive and better deal with their emotions, study shows”, Adelaide Now, 25 August 2014.
- Television interview, Channel 9 National News, 25 August 2014.
- Television interview, Channel 10 National News, 25 August 2014.
- Radio interview, 891 ABC Adelaide, Adelaide, 25 August 2014.
- Interview with Dr Wendy Craik, Presiding Commissioner, Productivity Commission Inquiry into Child Care and Early Childhood Learning, 19 December 2013.

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Abbreviations

ARIA	Accessibility and Remoteness Index of Australia
ARS	Academic Rating Scale
ATT	Average Treatment Effect on the Treated
CCB	Child Care Benefit
CCR	Child Care Rebate
CI	Confidence Interval
DAG	Directed Acyclic Graph
ECERS-R	Early Childhood Environment Rating Scale – Revised
EPPE	Effective Provision of Pre-School Education Project
EMM	Effect Measure Modification
IQR	Interquartile range
K6	Kessler 6 Scale
LSAC	Longitudinal Study of Australian Children
NICHD	National Institute of Child Health and Development
OECD	Organisation for Economic Co-operation and Development
ORCE	Observational Record of the Caregiving Environment
PPVT	Peabody Picture Vocabulary Test
RII	Relative Index of Inequality
SD	Standard Deviation
SDQ	Strength and Difficulties Questionnaire
SII	Slope Index of Inequality
UK	United Kingdom of Great Britain and Northern Ireland
USA	United States of America

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