

The relationship between early adolescent cyberbullying victimization and later emotional wellbeing and academic achievement

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Abstract

This study addresses a knowledge gap in the literature about early adolescent cyberbullying victimization and the related positive and negative emotional wellbeing and academic achievement outcomes experienced over time. The study examines 9139 South Australian students (aged 10–13 years) who reported on cyberbullying status in Grade 6, and explores the relationship with emotional wellbeing and academic achievement outcomes measured in Grade 7 and Grade 9, while accounting for range of child, peer, school, and community covariates. Using mixed effects modeling, the results show that cyberbullying victimization is associated with significantly lower levels of happiness, life satisfaction, and higher levels of sadness, and worries over the shorter term (Grade 7), and significantly lower levels of reading and numeracy sustained across the longer term (Grades 7 and 9), compared to non-victimization. The results indicate that early adolescent cyberbullying may be associated with poor emotional wellbeing and academic achievement as one progresses through formal school and highlights the importance of considering the outcomes of bullying victimization beyond the immediate instance.

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KEYWORDS

administrators, counselors, psychology, school psychologists, schools, teachers

1 | INTRODUCTION

While previous work has established that bullying can result in a wide range of long-lasting adverse mental health, wellbeing, and academic outcomes (Hawker & Boulton, 2000; Moore et al., 2017), there remains a knowledge gap regarding the impact of early adolescent cyberbullying victimization (occurring when the victim is under 13 years of age), particularly for positive aspects of wellbeing, which are recognized to contribute independently to mental health (Halliday et al., 2021; Keyes & Lopez, 2002). Therefore, this study investigates whether experiencing cyberbullying victimization in early adolescence has longer-term associations with positive (e.g., happiness) and negative (e.g., sadness) emotional wellbeing and academic achievement as one progresses through formal schooling.

1.1 | What is cyberbullying?

Similar to traditional forms of bullying, cyberbullying is defined as repeated and ongoing intentional harm to another, but extends to include the use of electronic or digital media to perform these behaviors (Tokunaga, 2010). Although cyberbullying and traditional bullying share similar features, they differ in important ways, justifying the separate consideration (Kowalski et al., 2014). The actual definition of cyberbullying differs from traditional bullying by omitting a known power imbalance between the perpetrator and the victim (Thomas et al., 2015; Vandebosch & Van Cleemput, 2008). This exclusion is because online environments can facilitate anonymity and allow the perpetrator to be unknown to the victim (Thomas et al., 2015; Vandebosch & Van Cleemput, 2008). In addition, traditional bullying in adolescence typically occurs during school hours, while cyberbullying has the capacity to occur at any time during the day or at night (Kowalski et al., 2014). As the focus of this paper is on victimization experiences, for clarity the term “cyberbullying” will be used throughout to refer to cyberbullying victimization.

Cyberbullying can peak at different times in adolescence, with early adolescence (10–13 years) identified as a time of increased turmoil, before occurrences decrease into the later years of adolescence (up to the age of 19 years) (Bettencourt & Farrell, 2013; Pichel et al., 2021; Sumter et al., 2012; Williford et al., 2011). A range of factors including biological changes (i.e., puberty), psychological issues (i.e., limited emotion regulation skills or depression symptomology), or societal influences (i.e., school transition) are suggested to contribute to a higher risk of bullying behaviors during these early adolescent years (Ashrafi et al., 2020; Brown et al., 2005; Eslea & Rees, 2001; Smith et al., 1999). Additional risk factors for bullying in early adolescence include internalizing (e.g., showing symptoms of depression and anxiety) and externalizing behaviors (e.g., displays of aggression or violence), poor social and emotional wellbeing, and lower peer acceptance (Cook et al., 2010; Zych et al., 2020).

Early adolescence is a key time for brain and social development and transition, and mental health impacts of cyberbullying have been identified throughout later adolescence (Camerini et al., 2020). It is therefore important to understand and address how cyberbullying during early adolescence may be associated with subsequent mental health and academic achievement. Despite this need, only one longitudinal study examining cyberbullying has been conducted using participants younger than 13 years of age ($M_{\text{age}} = 9.35$ at T_1) (DePaolis & Williford, 2019). This limitation could be due to the assumption that cyberbullying is less prevalent during early adolescence. Whilst age restrictions exist for social media sites (above 13 years), young adolescents are increasingly owning smartphones or devices which give access to these online environments.

Social media and gaming sites like Facebook, Instagram, Snapchat, Twitter, Fortnite, and Minecraft require users to be over the age of 13 to register; however, a representative 2021 national survey ($n = 1000$) conducted in the United States (US) found 45% of participants aged 9–12 were using Facebook daily, 40% used Instagram and Snapchat daily, 30% were using Twitter daily, 23% were playing the online game “Minecraft”, and 22% were playing the online game “Fortnite” daily (Thorn, 2021). Furthermore, 38% of 9- to 12-year olds in this study reported cyberbullying on these platforms, with Snapchat (26%), Instagram (26%), and YouTube (19%) identified as the sites where cyberbullying occurred most frequently. In addition, recent reports have indicated that more than one in three Australian children (total $n = 2500$) aged between 6 and 13 years old own the smartphone they use (Roy Morgan Research, 2020) and 44% (total $n = 1440$) of US children aged 0–8 years own their own tablet device (Rideout & Robb, 2020). These results suggest that phone and/or device ownership, and the experience of cyberbullying on social media and gaming sites, is common for individuals under 13 years of age. As such, it is erroneous to assume that age restrictions prevent young people from using these sites. Given that experiences of traditional bullying for individuals under 13 years can have long-lasting implications in later adolescence and adulthood (Halliday et al., 2021; Wolke & Lereya, 2015), it is important to pay attention to this population to identify and address possible long-term outcomes of cyberbullying.

1.2 | Emotional wellbeing outcomes associated with cyberbullying

Both traditional and cyberbullying have adverse outcomes for adolescent mental health (Foody et al., 2019; Halliday et al., 2021; Zych et al., 2015). Recent reviews (Halliday et al., 2021; Moore et al., 2017) highlight limitations in the evidence base, notably a paucity of research on the effects of early adolescent cyberbullying over both the short- and longer-term for outcomes including both negative (e.g., sadness, worries) and positive (e.g., happiness, life satisfaction) wellbeing indicators. One review (Kowalski et al., 2014) has found cyberbullying to be associated with lower life satisfaction ($r = -.21$), self-esteem ($r = -.17$), and prosocial behavior ($r = -.06$); however, the included studies were cross-sectional in design, reducing the ability to develop an understanding of the direction of effects. While individual studies have reported that cyberbullying affects self-esteem after 2 years (DePaolis & Williford, 2019) and overall subjective wellbeing 1 year later (Fahy et al., 2016), no studies to date have assessed the longer term positive wellbeing outcomes of cyberbullying beyond 24 months. The current study addresses this by examining both positive *and* negative wellbeing (Keyes & Lopez, 2002), along with academic achievement, 1 and 3 years following the experience of cyberbullying.

The Complete State Model of Mental Health (Keyes & Lopez, 2002) and the World Health Organization (2018) highlight that mental health is more than the absence of symptoms of mental illness. To be mentally healthy, a person needs to experience complete physical, mental, and social wellbeing (World Health Organization, 2018). Despite this, much of the work in the bullying literature focuses on psychopathology (such as depression and anxiety) (Antaramian et al., 2010; Fullchange & Furlong, 2016). Given that the Complete State Model of Mental Health considers functioning to be impacted by positive aspects of mental health (i.e., psychological wellbeing) and psychopathology, this study includes measures of both positive and negative wellbeing to gain a more complete view of mental health.

1.3 | Academic outcomes associated with cyberbullying

A meta-analysis of 12 cross-sectional articles reporting 25 different effect sizes found evidence to suggest that cyberbullying victims (aged 12.5–16.2 years) reported higher academic achievement problems ($r = .14$), higher school attendance problems ($r = .20$), and lower academic performance ($r = .22$) than non-victims, while accounting for demographics (Gardella et al., 2017). A limitation of this meta-analysis is that the authors reported that no longitudinal studies examined cyberbullying victimization and associated academic outcomes at the time of the review. Liu et al. (2021) have since conducted a 2-year longitudinal study (M_{age} at $T_1 = 9.91$) that examined the impact of cyberbullying on academic achievement in Mathematics, English, and Chinese, but found that cyberbullying did not predict lower

academic achievement over time, after controlling for demographics. The mixed evidence to date regarding academic achievement following early adolescent cyberbullying suggests a need for further research in this space.

1.4 | Factors related to cyberbullying, emotional wellbeing, and academic achievement

There are many risk and protective factors for cyberbullying victimization, with many of these also related to emotional wellbeing and academic achievement (Babarro et al., 2020; Stoliker, 2018; Tokunaga, 2010; Zych et al., 2020). In adolescence, cyberbullying, emotional wellbeing, and academic achievement can be affected by child-level factors (such as gender, language spoken at home, and sleep), experiences at school with teachers and peers (such as friendships with others and perceived levels of school climate), or the wider environment (such as the socioeconomic area where one resides) (Aldridge & McChesney, 2018; Babarro et al., 2020; Loft & Waldfogel, 2021; Tarokh et al., 2016). As these factors are known to be related to cyberbullying, emotional wellbeing, and academic achievement, it is important to consider and account for their impact in the current study. Bronfenbrenner's (1977) Ecological Systems Theory posits that the interactions between adolescents and their surrounding systems have an influence on healthy development. According to Bronfenbrenner, these environments are organized into systems according to the level of influence on adolescent development and wellbeing. More direct influences include interactions with parents, peers, and school personnel, while the wider community and neighborhood environments impact less directly on the adolescent, but are still understood to affect development and wellbeing. Many of the factors that are related to cyberbullying, emotional wellbeing, and academic achievement exist in the microsystem and exosystem and are therefore likely to exert influence on adolescent development and mental health, which is why the current study uses the Ecological Systems framework to organize and consider the covariates.

1.5 | The current study

Early adolescence, and particularly the period before the age of 13, has been largely overlooked in the cyberbullying literature, despite approximately 50% of cyberbullying victims reporting that they experienced victimization between ages 10–12 years (Price & Dagleish, 2010). In addition, the impact of cyberbullying on positive wellbeing and longer-term academic achievement outcomes are also often overlooked (Halliday et al., 2021). We aim to extend the literature by addressing these limitations. This study therefore utilized a large population-based cohort of school students to examine whether experiencing cyberbullying victimization in early adolescence (Grade 6) is associated with positive and negative emotional wellbeing indicators and academic achievement in Grade 7 and Grade 9, before and after accounting for a wide range of child, peer, school, and community variables. By understanding the long-term results of cyberbullying in early adolescence, school psychologists, and teachers may be able to implement effective programs in younger grades, with the goal of preventing or mitigating the consequences for mental health and academic achievement.

2 | METHODS

2.1 | Data sources

2.1.1 | The Wellbeing and Engagement Collection data set

The Wellbeing and Engagement Collection (WEC) is an annual survey administered to students in the state of South Australia by the Department for Education and is designed to capture the nonacademic factors relevant to learning and participation (Gregory et al., 2021). The survey aims to assist schools, communities, and the government in

determining opportunities and resources that can help students reach their full potential by measuring four broad areas of a student's life: (1) emotional wellbeing, (2) engagement with school, (3) learning readiness, and (4) health and wellbeing out of school (Gregory et al., 2021). For additional details regarding the WEC, including information on data collection and psychometric data (e.g., reliability and validity) for all measures used in this study, see Gregory et al. (2021) and Gregory and Brinkman (2020).

The administration of the WEC survey began in 2013 with a sample of 6000 Grade 6 students and has increased over time to include more than 95,000 South Australian student participants in 2019, ranging from Grades 4 to 12 (Gregory et al., 2021). In October and November 2016, the first time point in the current study, 717 schools were invited to participate in the WEC. Of those who participated, 466 were government schools, 26 Catholic schools, and 8 independent schools (Gregory & Brinkman, 2020; Gregory et al., 2021). For this study, only student results from government schools were used, as they could be linked to demographic information about the students collected through the school enrollment census and academic achievement results from the National Assessment Program—Literacy and Numeracy (NAPLAN).

2.1.2 | The National Assessment Program—Literacy and Numeracy

The NAPLAN is an annual assessment that examines students' abilities in reading, writing, language conventions (spelling, grammar, and punctuation), and numeracy (Australian Curriculum Assessment and Reporting Authority, 2016). These standardized tests of achievement are administered to Australian students in Grades 3, 5, 7 and 9, approximately corresponding to ages 8, 10, 12, and 14 years old, respectively, and determine whether students hold the literacy and numeracy skills essential to succeed in school and further life (Australian Curriculum Assessment and Reporting Authority, 2016).

2.2 | The current study

2.2.1 | Participants

Participants in this historical cohort study comprised South Australian government school students who participated in the WEC in Grade 6 in 2016 and were followed up in Grades 7 (2017) and 9 (2019). A total of 9139 students completed the WEC and reported their cyberbullying status in Grade 6. In this sample ($n = 9139$), 49.5% were female, 4.4% identified as Aboriginal and/or Torres Strait Islander, 76.1% identified English only as their language background, 26.3% lived in the most socioeconomically disadvantaged communities in the state, and 7.2% reported being cyberbullied (see Table 1 for sociodemographic characteristics of cyberbullying victims compared with non-victims). Approximately, 86% of participants had follow-up emotional wellbeing data, and 91% had follow-up academic achievement data in Grade 7 and/or Grade 9 (see data preparation section for more details, including explanations of sample attrition).

2.2.2 | Measures

Cyberbullying

The frequency of cyberbullying was measured using an item from the Middle Years Development Instrument (Schonert-Reichl et al., 2013). In Grade 6, students were asked, "This school year, how often have you been bullied by other students in the following ways?", with a description of cyberbullying provided (e.g., someone used the computer or text messages to exclude, threaten, humiliate you, or to hurt your feelings). Responses were made on a Likert response scale with 1 indicating "not at all this school year", 2 "once or a few times", 3 "about every month", 4 "about every week", and 5 "many times a week". To determine victims from non-victims, the well-recognized

TABLE 1 Demographic characteristics of victims and non-victims of cyberbullying in Grade 6 ($n = 9139$).

| Cyberbullying status | Victim | | Non-victim | |
|--|----------|------|------------|------|
| | <i>n</i> | % | <i>n</i> | % |
| Total | 660 | 7.2 | 8479 | 92.8 |
| Gender | | | | |
| Male | 342 | 51.8 | 4271 | 50.4 |
| Female | 318 | 48.2 | 4208 | 49.6 |
| Language background | | | | |
| English only | 535 | 81.1 | 6416 | 75.7 |
| Language background other than English | 125 | 18.9 | 2063 | 24.3 |
| Aboriginal and/or Torres Strait Islander | | | | |
| Yes | 51 | 7.8 | 345 | 4.1 |
| No | 601 | 92.2 | 8022 | 95.9 |
| Socioeconomic status | | | | |
| 1—Most disadvantaged | 248 | 37.6 | 2154 | 25.4 |
| 2 | 113 | 17.1 | 1369 | 16.1 |
| 3 | 106 | 16.1 | 1355 | 16.0 |
| 4 | 120 | 18.2 | 1786 | 21.1 |
| 5—Most advantaged | 73 | 11.1 | 1815 | 21.4 |

Note: Socioeconomic status was measured using the Socio-Economic Index for Areas (SEIFA). SEIFA is a set of measures derived from the Australian Bureau of Statistics (ABS) census information that summarize different aspects of socioeconomic conditions in an area. The particular socioeconomic index used was The Index of Relative Socio-economic Advantage and Disadvantage.

definition described by Tokunaga (2010) was used to capture *repeated* experiences, an essential component of identifying bullying victims. Therefore in this study, cyberbullying victimization was defined as the experience of cyberbullying at least every month (Responses 3, 4, and 5) with Responses 1 and 2 indicating non-victim responses. The decision to dichotomize cyberbullying victimization was done to produce results that are of practical use for school psychologists and intervention design.

Emotional wellbeing outcomes

To assess the positive and negative emotional wellbeing outcomes of the students, scores on five WEC measures (emotion regulation, happiness, life satisfaction, sadness, and worries) in Grade 7 and Grade 9 were used. These were chosen as variables of interest in this study as they were deemed to reflect positive and negative aspects of wellbeing, and these scales were included in the WEC survey for both the 2017 and 2019 collection cycles. The items for all measures of emotional wellbeing are presented in Table 2.

Academic achievement outcomes

Students complete assessments in five domains, which include an assessment of numeracy, along with four domains assessing aspects of literacy; reading, writing, spelling, language conventions (grammar and punctuation). Scores on two of these domains (reading and numeracy) were used in the current study to cover the two key areas of academic achievement (literacy and numeracy). Of the four literacy domains, reading was selected because it is the

TABLE 2 Emotional wellbeing and covariate outcomes measured by the Wellbeing and Engagement Collection (WEC).

| Variables | Scale | Item | Likert response scale |
|------------------------------|--|--|--|
| Emotional wellbeing measures | | | |
| Emotion regulation | Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA) (Gullone & Taffe, 2012) | <ol style="list-style-type: none"> 1. When I want to feel happier, I think about something different. 2. When I want to feel less bad (e.g., sad, angry, or worried), I think about something different. 3. When I'm worried about something, I make myself think about it in a different way and that helps me feel better 4. When I want to feel happier about something, I change the way I'm thinking about it 5. I control my feelings about things by changing the way I'm thinking about them 6. When I want to feel less bad (e.g. sad, angry or worried), I change the way I'm thinking about it. | 1 = strongly disagree to 5 = strongly agree |
| Happiness | 4-Item Happiness Scale—EPOCH Measure of Adolescent Wellbeing (Kern et al., 2015) | <ol style="list-style-type: none"> 1. I feel happy 2. I have a lot of fun 3. I love life 4. I am a cheerful person. | 1 = almost never to 5 = almost always 1 = not at all like me to 5 = very much like me |
| Life satisfaction | 5-Item Satisfaction with Life Scale—Adapted for Children (Gademann et al., 2010) | <ol style="list-style-type: none"> 1. In most ways my life is close to the way I want it to be. 2. The things in my life are excellent. 3. I am happy with my life. 4. So far I have gotten the important things I want in life. 5. If I could live my life over again, I would have it the same way. | 1 = disagree a lot to 5 = agree a lot |
| Sadness | 3-Item Sadness Scale—Middle Years Development Instrument (Schonert-Reichl et al., 2013) | <ol style="list-style-type: none"> 1. I feel unhappy a lot of the time. 2. I feel upset about things. 3. I feel that I do things wrong a lot. | 1 = disagree a lot to 5 = agree a lot |
| Worries | 4-Item Worries Scale (Gregory et al., 2016) | <ol style="list-style-type: none"> 1. I worry a lot about things at home. | 1 = disagree a lot to |

(Continues)

TABLE 2 (Continued)

| Variables | Scale | Item | Likert response scale |
|--|---|--|--|
| | | <ol style="list-style-type: none"> I worry a lot about things at school. I worry a lot about mistakes that I make. I worry about things. | 5 = agree a lot |
| Child, peer, and school covariate measures | | | |
| Sleep quality | Middle Years Development Instrument (Schonert-Reichl et al., 2013) | 1. How often do you get a good night's sleep? | 1 = never to 8 = every day |
| Peer belonging | 3-Item Peer Belonging Scale—Middle Years Development Instrument (Schonert-Reichl et al., 2013) | <ol style="list-style-type: none"> I feel a part of a group of friends that do things together. I feel that I usually fit in with other kids around me. When I am with other kids my age, I feel I belong. | 1 = disagree a lot to 5 = agree a lot |
| Friendship intimacy | 3-Item Friendship Intimacy Scale—Middle Years Development Instrument (Schonert-Reichl et al., 2013) | <ol style="list-style-type: none"> I have at least one really good friend I can talk to when something is bothering me. I have a friend I can tell everything to. There is somebody my age who really understands me. | 1 = disagree a lot to 5 = agree a lot |
| Connectedness to adults in school | 3-Item Connectedness to Adults at School Scale—Middle Years Development Instrument (Schonert-Reichl et al., 2013) | <p>At my school, there is a teacher or another adult...</p> <ol style="list-style-type: none"> ... who really cares about me. ... who believes that I will be a success. ... who listens to me when I have something to say | 1 = not at all true to 4 = very much true |
| Emotional engagement with teachers | 5-Item Student–Teacher Relations Scale—PISA Student Context Questionnaire Program of International Student Achievement (PISA) | <ol style="list-style-type: none"> I get along well with most of my teachers. Most of my teachers are interested in my wellbeing. Most of my teachers really listen to what I have to say. If I need extra help, I will receive it from my teachers. Most of my teachers treat me fairly. | 1 = strongly disagree to 4 = strongly agree |
| School climate | 3-Item School Climate scale—Middle Years Development Instrument (Schonert-Reichl et al., 2013) | <ol style="list-style-type: none"> Teachers and students treat each other with respect in this school. People care about each other in this school. Students in this school help each other, even if they are not friends. | 1 = disagree a lot to 5 = agree |

most frequently reported literacy test within the South Australian Education Department, and because it is necessary to develop reading skills before developing those of writing, spelling, grammar, and punctuation. The assessment of reading ability includes reading various writing styles (e.g., poems, narratives, persuasive, and informational) from a magazine and answering questions related to comprehension of the material. The domain of numeracy was chosen given its consideration in the Australian curriculum as fundamental to a student's ability to learn at school and to engage productively in society (Australian Curriculum Assessment and Reporting Authority, 2016). To assess numeracy, multiple-choice questions and short answer responses are used to test students' abilities in numeracy and algebra, measurement and geometry, and statistics and probability. Each student had two standard scores for this study: one representing reading competency and one representing numeracy competency. Standard scores range from 0 to 1000 for Grade 3 to Grade 9 and are constructed so that any score represents the same level of achievement over time. For example, a score of 500 in 2017 and 2019 will have the same meaning (Australian Curriculum Assessment and Reporting Authority, 2016).

Child, peer, school, and community covariates

Child, peer, school, and community covariates were measured in Grade 6 along with cyberbullying status. The covariate measures selected for the current study and collected in the WEC are described in Table 2. As highlighted earlier in this paper, Bronfenbrenner's (1977) Ecological Systems Theory is useful for examining factors that can influence adolescent wellbeing, and thus, was used as a framework in the current study to synthesize the range of child, peer, school, and community covariates. This considered child, peer, and school factors at the microsystem level and community factors (i.e., the classification of different geographical areas based on the relative socioeconomic advantage and disadvantage (Socio-Economic Index for Areas [SEIFA]) at the exosystem level.

2.2.3 | Microsystem factors

Child covariates

Demographic information on gender, Aboriginal and/or Torres Strait Islander status, language spoken at home, as well as sleep quality were used in the current study. These were completed by parents/guardians at school enrollment or by students at the beginning of the WEC survey. Sleep quality was included as a covariate as poor sleep quality has been linked to both cyberbullying (Erreygers et al., 2019) and lower emotional wellbeing (Baum et al., 2014; Feingold & Smiley, 2022; Shin & Kim, 2018).

Peer covariates

To assess peer covariates, measures of friendship intimacy and peer belonging were obtained from the WEC (see Table 2 for details).

School covariates

The WEC variables of connectedness to adults in school, emotional engagement with teachers, and school climate were evaluated as school covariates (items shown in Table 2).

2.2.4 | Exosystem factors

Community covariate

To capture information on the socio-economic status of the community in which the student lived, the 2016 SEIFA Index of Relative Socio-economic Advantage and Disadvantage was used. SEIFA is used to classify different geographical areas in Australia based on relative socioeconomic advantage and disadvantage using data from the

five-yearly population census (Australian Bureau of Statistics, 2018). In the current study, SEIFA was assigned to each student based on their postcode of residence (i.e., zip code). The socioeconomic advantage and disadvantage of an area is established by determining the residents access to material and social resources, and their ability to participate in society. Specifically, SEIFA is determined by the income, education, employment, occupation, and housing of residents in the community. As a result, the current study considered this measure as a community covariate, as it captures the socioeconomic status of the wider area in which the household resides.

2.3 | Statistical analysis

All data were analyzed using the Statistical Package for the Social Sciences, version 28. Before the main analyses, the prevalence of cyberbullying was explored and the demographic characteristics (gender, language background, Aboriginal and/or Torres Strait Islander status, and socioeconomic status) of victims and non-victims of cyberbullying in Grade 6 were examined (see Table 1).

Mixed effects modeling was used to estimate mean emotional wellbeing and academic achievement scores in Grades 7 and 9 for victims and non-victims of cyberbullying in Grade 6. These models were run before and after adjusting for child, peer, school, and community covariates. The covariates were measured in Grade 6, at the same time that cyberbullying victimization was measured. Mixed effects models were utilized as these models allow for fixed and random effects, account for missing data in the analyses, and handle complex situations by considering nesting at the subject and school level as random effects, both of which were accounted for in the current analyses (Fitzmaurice et al., 2011). For descriptive purposes, means and standard errors from the unadjusted mixed effects models for each emotional wellbeing and academic achievement outcome (Grades 7 and 9) for cyberbullying victims and non-victims are presented in Table 3.

Two mixed effects models were run for cyberbullying and each emotional wellbeing and academic achievement outcome, with results depicted in Table 4. The first was an unadjusted model to estimate the raw association between cyberbullying and each outcome, and the second model adjusted for child, peer, school, and community covariates. The mean difference between victims and non-victims on each of the outcomes (e.g., happiness) in Grades 7 and 9 were estimated from the mixed models (see Table 4), and a significance test was conducted to test whether the mean difference was significantly different from zero. That is, whether victims and non-victims had significantly different emotional and academic achievement outcomes in Grades 7 and 9, before and after adjustment for covariates. Effect sizes were obtained using Cohen's d , calculated using the mean and standard deviation for each outcome pair (victim vs. non-victim) in both unadjusted and adjusted models. Cohen's (1962) guidelines were used to interpret the size of the effects, with $d = 0.2$ being considered a small effect, $d = 0.5$ represents a medium effect, and a large effect represented by $d = 0.8$.

2.3.1 | Data preparation

The following section describes the steps of data preparation and the analysis sample used to answer the research questions. The baseline sample comprised 9139 Grade 6 students who had complete data on exposure (cyberbullying victimization) and covariate variables in 2016. One of the advantages of mixed effects models is their ability to account for missing data in analyses by employing an unbiased restricted maximum likelihood approach, and to calculate model estimates in the absence of complete data. Analyses were run separately for each outcome measure, and provided that a student had follow-up data from at least one time point (Grade 7 or 9), they were included in the analysis sample for the mixed effects model. The number (percentage) of students with follow-up data in Grade 7 and/or Grade 9, who formed the analysis sample for each outcome, were as follows: 7819 students (86%) had data for emotion regulation; 7841 students (86%) had data for happiness; 7813 (86%) had data for life

TABLE 3 Estimated means and standard errors for emotional wellbeing and academic achievement in Grade 7 and Grade 9 for victims and non-victims of cyberbullying in Grade 6 from mixed effects models (unadjusted model).

| Cyberbullying status | Grade 7 | | Grade 9 | |
|---|------------------|----------------------|------------------|----------------------|
| | Victim M (SE) | Non-victim M (SE) | Victim M (SE) | Non-victim M (SE) |
| Emotional wellbeing^a | | | | |
| Emotion regulation | 3.17 (0.04) | 3.37 (0.01) | 3.12 (0.05) | 3.21 (0.02) |
| Happiness | 3.45 (0.04) | 3.85 (0.01) | 3.43 (0.05) | 3.66 (0.02) |
| Life Satisfaction | 3.35 (0.04) | 3.76 (0.02) | 3.21 (0.05) | 3.41 (0.02) |
| Sadness | 3.03 (0.05) | 2.50 (0.02) | 3.16 (0.06) | 2.86 (0.02) |
| Worries | 3.33 (0.05) | 2.85 (0.02) | 3.42 (0.06) | 3.14 (0.02) |
| Academic achievement^b | | | | |
| Literacy (reading) | 507.49 (3.01) | 537.77 (1.61) | 537.15 (3.27) | 569.42 (1.63) |
| Numeracy | 513.15 (2.84) | 538.35 (1.60) | 552.92 (2.96) | 574.12 (1.61) |

^aScores for emotional wellbeing measures range from 1 to 5. Higher scores on the measures of emotion regulation, happiness, and life satisfaction indicate higher wellbeing. For the measures of sadness and worries, a higher score indicates lower wellbeing.

^bNAPLAN results are standard scale scores ranging from 0 to 1000. Sample size ranged from 7813 (life satisfaction) to 8305 (reading).

satisfaction; 7825 (86%) had data for sadness; 7828 (86%) had data for worries; 8305 (91%) had data for reading; and 8271 (91%) had data for numeracy. The main reasons for sample attrition over time were: (1) school-level nonparticipation in the WEC, (2) student-level nonparticipation in the WEC, and (3) student nonparticipation in standardized tests of academic achievement due to being absent on the day, exempt, or withdrawn by their parents.

2.4 | Results

The means presented in Table 3 show that, compared to non-victims, victims of cyberbullying in Grade 6 consistently scored lower on measures of positive emotional wellbeing, higher on negative emotional wellbeing indicators, and lower on measures of academic achievement in both Grades 7 and 9. For example, students who experienced cyberbullying in Grade 6 had a mean score of 507.49 on reading achievement in Grade 7 compared to a mean score of 537.77 for students who did not experience cyberbullying.

Table 4 shows the results of mixed effects model analyses that examined the association between cyberbullying and measures of emotional wellbeing and academic achievement over the short and long term, before and after adjusting for a range of covariates. Specifically, Table 4 presents the mean difference between victims and non-victims on each of the outcomes (e.g., happiness) in Grades 7 and 9. Negative mean difference values indicate that victims scored lower than non-victims on outcomes in Grade 7 and Grade 9, while positive mean difference values indicate that victims scored higher than non-victims. Figures 1 and 2 visually represent the estimated marginal mean scores (i.e., mean scores from adjusted model) on emotional wellbeing and academic achievement outcomes in Grades 7 and 9 for students who were and were not cyberbullied in Grade 6. Figure 1 represents the mean scores for victims and non-victims on emotion regulation, happiness, life satisfaction, sadness, and worries. Figure 2 represents the reading and numeracy scores for victims and non-victims in Grades 7 and 9.

TABLE 4 Mean differences in emotional wellbeing and academic achievement (Grade 7 and Grade 9) between victims and non-victims of cyberbullying in Grade 6 from mixed effects models.

| | Before adjustments ^b | | After adjustments ^a | |
|--------------------------------|---------------------------------|------------------|--------------------------------|------------------|
| | Mean difference | (95% CI) | Mean difference | (95% CI) |
| Emotional wellbeing | | | | |
| Emotion regulation | | | | |
| Grade 7: victim vs. non-victim | -0.20*** | (-0.28, -0.11) | 0.03 | (-0.05, 0.11) |
| Grade 9: victim vs. non-victim | -0.09 | (-0.19, 0.01) | 0.14** | (0.04, 0.23) |
| Happiness | | | | |
| Grade 7: victim vs. non-victim | -0.40*** | (-0.48, -0.32) | -0.16*** | (-0.23, -0.08) |
| Grade 9: victim vs. non-victim | -0.23*** | (-0.32, -0.13) | 0.01 | (-0.08, 0.10) |
| Life satisfaction | | | | |
| Grade 7: victim vs. non-victim | -0.41*** | (-0.50, -0.32) | -0.15*** | (-0.23, -0.07) |
| Grade 9: victim vs. non-victim | -0.20*** | (-0.30, -0.10) | 0.06 | (-0.03, 0.16) |
| Sadness | | | | |
| Grade 7: victim vs. non-victim | 0.53*** | (0.44, 0.62) | 0.28*** | (0.19, 0.37) |
| Grade 9: victim vs. non-victim | 0.30*** | (0.19, 0.41) | 0.05 | (-0.06, 0.15) |
| Worries | | | | |
| Grade 7: victim vs. non-victim | 0.49*** | (0.39, 0.59) | 0.28*** | (0.18, 0.37) |
| Grade 9: victim vs. non-victim | 0.28*** | (0.16, 0.40) | .07 | (-0.05, 0.18) |
| Academic achievement | | | | |
| Literacy (reading) | | | | |
| Grade 7: victim vs. non-victim | -30.28*** | (-35.88, -24.68) | -27.97*** | (-33.55, -22.39) |
| Grade 9: victim vs. non-victim | -32.26*** | (-38.25, -26.28) | -29.90*** | (-35.86, -23.94) |

TABLE 4 (Continued)

| | Before adjustments ^b | | After adjustments ^a | |
|--------------------------------|---------------------------------|------------------|--------------------------------|------------------|
| | Mean difference | (95% CI) | Mean difference | (95% CI) |
| Numeracy | | | | |
| Grade 7: victim vs. non-victim | -25.20*** | (-30.16, -20.24) | -21.06*** | (-25.99, -16.12) |
| Grade 9: victim vs. non-victim | -21.19*** | (-26.44, -15.95) | -17.06*** | (-22.29, -11.84) |

Note: Cohen's *d* effect interpretation: small = 0.2, medium = 0.5, large = 0.8 (Cohen, 1962).

^aAdjusted models accounted for the following covariates (gender, age, language background, Aboriginal and/or Torres Strait Islander status, socioeconomic status, connectedness to adults in school, emotional engagement with teacher, friendship intimacy, peer belonging, school climate, and sleep).

^bNegative mean difference values indicate that cyberbullying victims scored lower on that measure, while positive mean difference values indicate that victims scored higher on that measure. The sample size ranged from 7813 (life satisfaction) to 8305 (reading).

****p* < .001; ***p* < .01; **p* < .05.

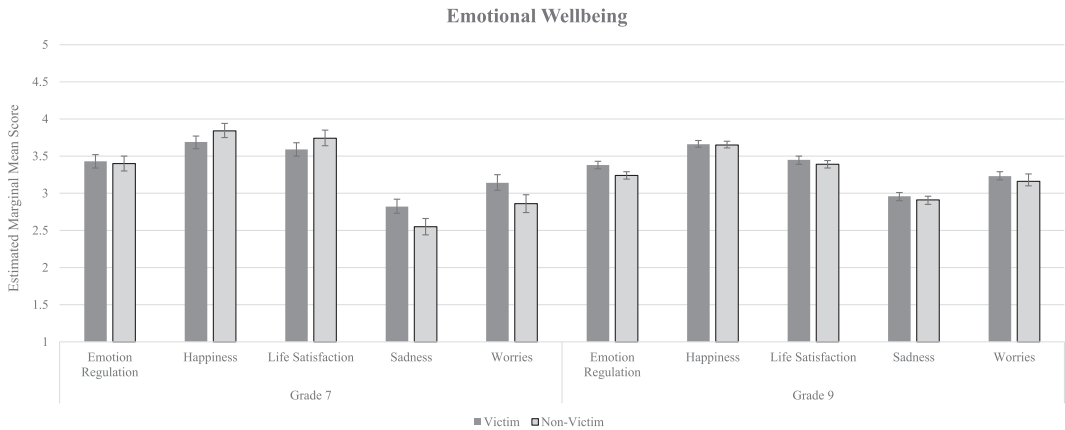


FIGURE 1 Estimated marginal means for emotional wellbeing outcomes (Grade 7 and 9) for victims and non-victims of Grade 6 cyberbullying (adjusted model). Of the baseline sample, 86% of students had follow-up data on emotional wellbeing outcomes with sample sizes ranging from 7813 (life satisfaction) to 7828 (worries) in mixed effects models. Higher scores on the measures of emotion regulation, happiness, and life satisfaction indicate higher wellbeing. For the measures of sadness and worries, a higher score indicates lower wellbeing.

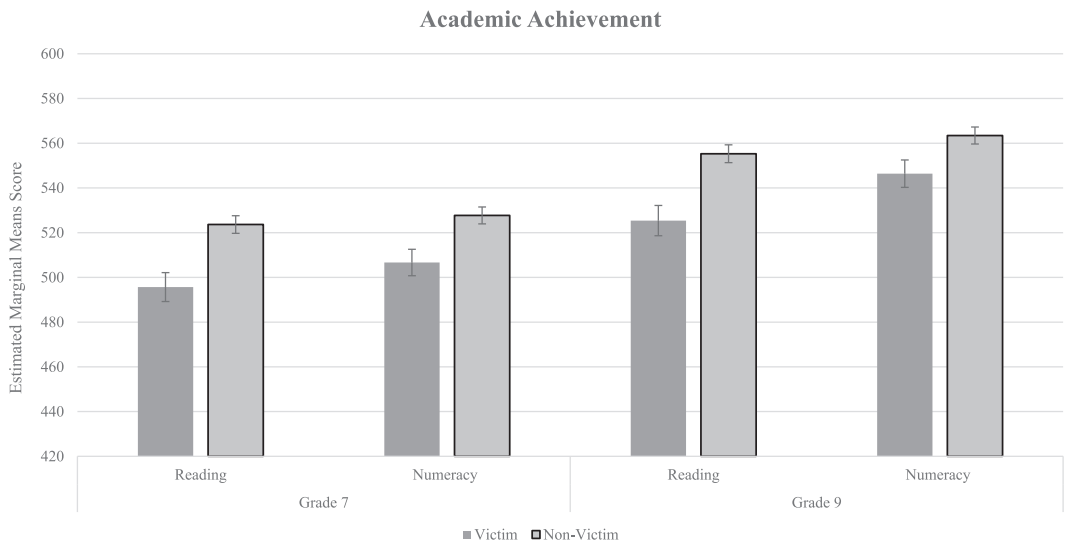


FIGURE 2 Estimated marginal means for academic achievement outcomes (Grade 7 and 9) for victims and non-victims of Grade 6 cyberbullying (adjusted model). Of the baseline sample, 91% of students had follow-up data on academic achievement outcomes with sample sizes ranging from 8271 (numeracy) to 8305 (reading) in mixed effects models.

2.4.1 | Positive wellbeing indicators

Before adjusting for covariates, victims of cyberbullying in Grade 6 scored significantly lower on all three measures of positive wellbeing (emotion regulation, happiness, and life satisfaction) in Grade 7 than non-victims, with small to medium sized effects. After accounting for covariates, the effects on emotion regulation Grade 7 became nonsignificant, and the effects on happiness and life satisfaction remained significant but reduced in size to small effects.

Unadjusted Grade 9 results indicated victims scored significantly lower on happiness and life satisfaction 3 years after the cyberbullying incident with small effects, while nonsignificant effects were detected for emotion regulation. After accounting for covariates, results for happiness and life satisfaction became nonsignificant, with delayed effects in the opposite direction to expected for emotion regulation. That is, students who experienced cyberbullying had significantly *higher* scores on emotion regulation in Grade 9 than non-victims, with no significant differences between victims and non-victims in Grade 7 after accounting for covariates.

2.4.2 | Negative wellbeing indicators

In both models, victims had significantly higher mean scores on sadness and worries. In unadjusted models, mean differences between victims and non-victims of cyberbullying on sadness and worries in Grade 7 were significant with medium effect sizes. Once covariates were adjusted for, short-term significant effects of cyberbullying on sadness and worries were maintained with a small effect.

In Grade 9, 3 years after the cyberbullying incident, unadjusted model results indicated that victims scored significantly higher than non-victims for sadness and worries, with small to medium effects. After adjusting for covariates, results became nonsignificant, suggesting that cyberbullying has a short-term, but not a sustained, effect on measures of sadness and worries.

2.4.3 | Academic achievement

In unadjusted models, victims of cyberbullying in Grade 6 scored significantly lower than non-victims on reading and numeracy in Grade 7, with medium sized effects. Significant mean differences of similar magnitude were maintained after adjusting for covariates.

By Grade 9, unadjusted models indicated that cyberbullying victims scored significantly lower than non-victims in reading and numeracy skills, with medium sized effects. The mean difference between victims and non-victims for reading scores remained significant and of medium effect after adjustments, with Figure 2 demonstrating that victims in Grade 9 showed a similar reading score to non-victims in Grade 7. Numeracy scores also remained significant but reduced to small effects once covariates were included. As such, the effects of cyberbullying on reading and numeracy scores were sustained over time from Grade 7 to 9.

3 | DISCUSSION

This study uses a large population-based cohort to examine the relationship between early adolescent cyberbullying and emotional wellbeing and academic achievement outcomes over the short- (1 year later) and longer- (3 years later) terms. In addition to focusing on the key developmental period of early adolescence, the selection of variables for this study was guided by the Complete State Model of Mental Health (Keyes & Lopez, 2002), which recognizes the importance of both positive and negative wellbeing to mental health, providing a unique contribution to the otherwise psychopathology focused literature, as well as statistical adjustment for a wide range of child, peer, school, and community covariates in the microsystem and exosystem (Bronfenbrenner, 1977). The results show that early adolescent cyberbullying in Grade 6 is associated with poorer emotion regulation, life satisfaction, happiness, reading, and numeracy, and higher levels of sadness and worries, that vary in terms of whether they are short-term effects (Grade 7), or sustained over time (Grades 7 and 9).

Regarding prevalence estimates, cyberbullying in the current sample (7.2%) is more common than in previous Australian (3.5%) (Jadambaa et al., 2019) and international (1.0%) (Wolke et al., 2017) studies using comparable age

groups. Furthermore, findings are consistent with previous studies that document the longitudinal association between cyberbullying and increased risk of experiencing negative wellbeing indicators (i.e., sadness and worries) (Cole et al., 2016; Fahy et al., 2016; Smokowski et al., 2014). In addition, this study was able to provide new evidence for the relationship between early adolescent cyberbullying and positive wellbeing indicators. In adjusted models, there were significant short-term associations between cyberbullying and life satisfaction and happiness (that were not observed 3 years later), with the reverse for emotion regulation (delayed associations only).

Mixed findings on the associations between cyberbullying and positive wellbeing indicators have been found in previous cross-sectional studies (Fahy et al., 2016; Halliday et al., 2021). For example, some cross-sectional studies suggest there is no significant association between cyberbullying and life satisfaction after controlling for demographic variables (Moore et al., 2012), while others report that cyberbullying is associated with emotion regulation, happiness, and life satisfaction after statistical adjustment for students demographic characteristics (Navarro et al., 2015) or many child, peer, and school covariates (Halliday et al., 2022). This study finds that after accounting for a wide range of child, peer, school, and community covariates, cyberbullying victims in Grade 6 had poorer wellbeing outcomes after a short-term follow-up period (Grade 7; 1 year later). Specifically, victims had lower levels of happiness and life satisfaction, and higher levels of sadness, and worries, than their peers who had not experienced cyberbullying. However, these effects were not sustained over time, and no significant differences in wellbeing were apparent at long-term follow-up (3 years later). This may be explained by adolescents learning more self-regulatory skills, prompted by the important developmental changes that are also experienced during this time (Gajda et al., 2022). Interestingly, the delayed effects of cyberbullying on emotion regulation were in the opposite direction to expected (i.e., victims had higher levels of emotion regulation than non-victims 3 years after the cyberbullying incident). While this was a surprising finding, it is possible that emotional regulation strategies, for example positive reappraisal, are employed by bullying victims, to cope with the negative experience of bullying (den Hamer & Konijn, 2016; Ferraz de Camargo & Rice, 2020). Victims may therefore be learning positive emotion regulation skills (such as positive reappraisal earlier than their non-victimized peers. This represents an area for future research.

Previous research in the field has implemented a cross-sectional study design, thus reducing the ability to determine the direction of the relationship, and has also predominately focused on older adolescent populations (see Kowalski et al., 2014 for meta-analytic findings). Since the Kowalski et al. (2014) meta-analysis, a longitudinal study conducted with early adolescents (DePaolis & Williford, 2019) found that cyberbullying at $M_{\text{age}} 9.35$ years negatively impacts symptoms of anxiety, depression, and self-esteem at $M_{\text{age}} 10$ years, while accounting for age, gender, and experience with traditional bullying perpetration and victimization. The current study was able to support the idea that cyberbullying in individuals under 13 years of age is present and harmful and was able to extend this knowledge by identifying short term (1 year later) and sustained (1 and 3 years later) associations with different aspects of emotional wellbeing and academic achievement. This is an important finding as teachers, clinicians, and school psychologists can now be made aware that negative symptoms associated with cyberbullying can be experienced over time (up to 3 years after exposure), highlighting the need for follow-up or ongoing interventions.

Furthermore, cyberbullying victims consistently scored significantly lower than non-victims on measures of reading and numeracy, even after accounting for child, peer, school, and community covariates. In fact, victims appear to be 2 years behind their non-victimized peers in reading, after accounting for covariates, with victims scoring similar in Grade 9 to what non-victims scored in Grade 7. Supporting previous meta-analytic findings from cross-sectional studies (Gardella et al., 2017; Kowalski et al., 2014), this study finds that academic achievement, specifically measures of reading and numeracy, is adversely affected by early adolescent cyberbullying, potentially due to victimized students avoiding school and falling behind in their studies. The results of the current study were inconsistent with those of Liu et al. (2021), who found no longitudinal association between early adolescent cyberbullying and individual subject scores (including Math and English). Both studies included participants under the age of 13 years, so this conflicting result may reflect differences between Chinese and Australian students and their experience of cyberbullying and online usage, or the measure of academic achievement as Liu et al. (2021)

used overall subject grades, while this study used standardized test scores. More research is needed to develop an appropriately nuanced understanding of the relationships between cyberbullying and aspects of academic achievement over different time periods and in a range of cultural contexts.

The limitations of this study highlight directions for future research in the area. First, as the WEC survey is designed to be delivered to many students of different backgrounds and ages, several scales, including those measuring cyberbullying, consist of single items. Using a multi-item cyberbullying measure may be beneficial to capture the different types of cyberbullying to determine if they contribute to differential outcomes. Given the measure of cyberbullying in the dataset utilized for the present study did not ask students to report on bullying perpetration, it is possible that students who were bully-victims may have also been unintentionally grouped with cyberbullying victims. It would be beneficial for researchers to consider including items on bullying perpetration, so future studies can accurately classify students as cyberbullying victims (only) and bully-victims. In light of recent research (Xie et al., 2023), future iterations of cyberbullying measures may also benefit from excluding bullying-related terms in titles and descriptions, as students are significantly less likely to report victimization due to the stigma associated with bullying. Furthermore, since only standardized reading and numeracy tests could be included in this study, the scope of the findings with respect to academic achievement may be restricted. Future research would benefit from including more measures of academic achievement, such as academic self-efficacy, GPA, and overall grades evaluated by teachers to gain a better understanding of the effects of early adolescent cyberbullying on academic achievement over time.

The current results have implications for the delivery of whole-school prevention and early intervention programs in educational settings. First, schools should consider implementing cyberbullying programs in school grades aligning with early adolescence, or even earlier. Doing this will introduce students to the dangers of online environments as soon as possible, with the aim of reducing participation in problematic online interactions, including cyberbullying, and developing the tools to deal with cyberbullying if it does occur. Furthermore, it may also be beneficial for schools to provide wellbeing programs to potentially reduce long-term outcomes for victims of cyberbullying by promoting ways to increase positive wellbeing while teaching students how to manage the negative impacts of bullying. This approach would support recent calls for school-based mental health programs to both build psychological wellbeing and provide supports to students experiencing psychopathology, as aligned with more holistic considerations of mental health (Doll et al., 2020). Interestingly, a recent meta-analysis found that interventions which simultaneously addressed social-emotional skills and bullying were not associated with greater effectiveness compared to interventions that focused solely on social-emotional skills or bullying (Gaffney et al., 2021). This suggests that while addressing cyberbullying and emotional wellbeing is important for students' development and overall wellbeing, it may be beneficial to target these concerns separately rather than trying to provide more generalized interventions with a range of targets.

At the individual student level, counselors and school psychologists should be aware that online experiences are an important consideration for understanding student wellbeing, and that cyberbullying can have short-term and sustained effects. As such, counselors and school psychologists should continue to monitor victims of cyberbullying, even if students initially show limited impacts to their emotional wellbeing or academic achievement. Furthermore, when working with students experiencing emotional distress and mental health difficulties, consideration of previous negative online experiences, including cyberbullying, even incidents occurring some years ago, should form part of the assessment process.

4 | CONCLUSION

The results of this study indicate that the associations between cyberbullying during early adolescence and later emotional wellbeing and academic outcomes are varied, including poorer indicators of positive *and* negative emotional wellbeing over the shorter term (1 year later), and lower levels of reading and numeracy that are

sustained over time (1 and 3 years). Although small to medium in effect size, these associations were statistically significant after adjusting for a wide range of child, peer, school, and community variables. This study contributes to the broader early adolescent cyberbullying literature by including follow-up measures of academic achievement and considering positive and negative indicators of wellbeing, consistent with the Complete State Model of Mental Health. Implications of this include the importance of school personnel being aware that victims of cyberbullying can experience emotional wellbeing issues up to 1 year after experiencing cyberbullying, as well as academic achievement concerns up to 3 years later. These considerations should be addressed in both intervention design and when working individually with students.

AUTHOR CONTRIBUTIONS

The authors confirm contribution to the paper as follows: study conception and design, all authors. Data collection, Sarah Halliday. Analysis and interpretation of results, all authors. Draft manuscript preparation, Sarah Halliday. All authors reviewed the results and approved the final version of the manuscript.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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