Factors Predicting the Mental Health of Adolescents Attending a Faith-based Australian School System: A Multi-group Structural Equation Analysis

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Abstract

Background

Adolescents attending Seventh-day Adventist schools (Adventist) in Australia tend to experience good health and exhibit better health behaviours than national norms, however few studies have investigated factors predicting their mental health.

Aims

The aim of this study was to explore the complex network of factors that predict the mental health status (MHS) of adolescents attending Adventist schools in Australia.

Methods

A survey instrument was used to collect data from 1527 secondary school students attending Adventist schools across Australia. Structural equation modeling was employed to examine

concomitantly the direct and indirect effects of childhood experiences, present attitudes and selected health behaviours on MHS.

Results

Childhood family dynamics had the strongest association with MHS ($\beta_{total} = 0.33$) followed by a sense of meaning and purpose ($\beta_{total} = 0.27$), perceived social misfit status ($\beta_{total} = -0.19$) and school academic performance ($\beta_{total} = 0.18$). Multi-group analysis found significant pathway differences in the model for gender with regards to the association of meaning and purpose, physical activity and sleep quantity with MHS.

Conclusions

The outcomes of the study highlight the importance of early positive childhood family dynamics and the discovery of meaning and purpose during adolescence to promote positive mental health among adolescents.

Introduction

Poor mental health in young people is a pressing global concern (Erskine et al., 2015). In a recent Australian report, which is the context of the present study, 14% of young people aged 4–17 years had experienced a mental health disorder in the preceding twelve months rising to 27% among the 18–24 year age group (Lawrence et al., 2016). In Australia, like many developed countries, nearly half (45%) of adults will experience a mental disorder in their lifetime (Australian Institute of Health and Welfare, 2016) and half of these mental health problems present by the age of 14 and three quarters by the mid 20's (WHO, n.d.).

Poor mental health can impede adolescent development and learning (Patel et al., 2007; Patton, Coffey, et al., 2014), and adversely affect the individual's trajectory through life. Poor mental health is associated with poor physical health, poor reproductive and sexual health,

poor academic achievement (Patel et al., 2007), unemployment (Colman et al., 2009), anti-social behaviour (Patel et al., 2007), illicit substance and alcohol use (Hopfer et al., 2013), self-harm and suicide, the latter being the leading cause of death among adolescents globally (Patel et al., 2007).

Adolescence is a critical life period where many developmental, biological, behavioural, social and lifestyle changes occur at different times depending on gender and the individual (Call et al., 2002; Erikson, 1968). Australian studies indicate that adolescent females experience poorer mental health than males which is thought to be associated with poor family dynamics, pressure at school and western societal pressures (Mission Australia, 2017). While a number of risk and protective factors influencing mental health among adolescents have been explored, evidence supports a complex multifactorial causation, with many of the associations between risk factors and poor mental health being bidirectional (AIHW, 2012f; Craig, Morton, Morey, et al., 2018; Lawrence et al., 2016; Patel et al., 2007). While various protective mechanisms are understood to buffer the risks of poor mental health, these are equally complex (Lawrence et al., 2016).

Several theoretical models have been developed to explain how the determinants of mental health have their influence (AIHW, 2012f; Kieling et al., 2011). These models organize determinants as proximal, such as health behaviours, through to distal, which include upstream social determinants such as school, family and peer environments. Other important determinants of mental health that have been identified in the theoretical models are attitudes relating to a sense of meaning and purpose (Brassai, Piko, & Steger, 2011; Burrow et al., 2010; Damon et al., 2003; Halama & Dědová, 2007a), social exclusion and feelings of being a social misfit (DeWall & Bushman, 2011; Huitsing, Veenstra, Sainio, & Salmivalli, 2012; Juvonen & Gross, 2005; Wright et al., 1986), and school academic performance (McLeod et

al., 2012). The influence of these determinants on mental health have not been comprehensively investigated through concomitant analyses.

Of particular interest to this study was the Seventh-day Adventist (Adventist) population who tend to experience lower rates of many chronic diseases in adulthood (Willett, 2003). Adventist adolescents have also been shown to have better health behaviours and outcomes than other Christian and non-religious adolescents (Craig et al., 2017; Craig, Morton, Kent, et al., 2018). A previous investigation has found that the mental health status of Adventist adolescents was predicted by health behaviours, childhood experiences and gender (Craig, Morton, Morey, et al., 2018) but no study has concomitantly investigated the complex relationships between the numerous determinants, both proximal and distal, of the mental health of this population. Students attending Adventist schools in Australia constitute an interesting study cohort in that only approximately half of the students attending identify as Adventist. Hence studies of this cohort allow for comparisons to be made between Adventists, who tend to have better health behaviours and health outcomes and, non-Adventists who are more representative of the general population.

Utilizing structural equation modeling (SEM), this study aimed to concomitantly explore the complex relationships between a number of factors that may predict the MHS of adolescents, including: childhood factors such as childhood family dynamics (CFD) and adverse childhood experiences (ACES); present attitudes such as perceived social misfit status, level of meaning and purpose and school academic performance; and select health behaviours such as participation in physical activity, fruit and vegetable consumption and sleep quantity. Further, the study aimed to explore gender variations in these relationships through multi-group SEM analyses. The findings of this study may provide a better understanding of the complex relationship between multiple factors and the MHS of Adventist adolescents and

inform the development of appropriate interventions for improving MHS in adolescent populations.

Methods

Study Participants

A survey was administered in 21 private secondary schools across Australia in 2012. Participation in the study was voluntary and anonymous and written consent was collected from the students as well as their parents or guardians. Completed responses were collected from 1527 students (mean age =14.7 years, age range = 12–18 years, 55% males). The study was approved by the Avondale College of Higher Education Human Research Ethics Committee (No:2011:21).

Survey Instrument

The survey instrument assessed the participant's MHS as well as factors relating to CFD, ACEs, religious affiliation, personal demographics, attitudes (perceived social misfit status, level of meaning and purpose and school academic performance), and select health behaviours (participation in physical activity, fruit and vegetable consumption, and sleep quantity).

Mental Health

Mental health status (MHS) was measured using the validated and reliable (Brazier et al., 1992) five-item mental health subscale (MHI-5) from the SF-36 ('RAND Health, 36-Item short form survey', n.d.), which measures general MHS. The literature indicates that the MHI-5 is a good predictor of mental health disorders including depression, generalized anxiety and affective disorders generally (Berwick et al., 1991; Strand, 2003). The five items that make up the MHI-5 are "How much of the time during the last four weeks": 1. "Have you been a very nervous person?" 2. "Have you felt so down in the dumps that nothing could

cheer you up?" 3. "Have you felt calm and peaceful?" 4. Have you felt down?" 5. "Have you been a happy person?" Each item has six response options ranging from "All of the time" to "Not at all." A standardized score on a scale of 0–100 was created for MHS, as previously described (Ware et al., 2000), with higher scores indicating better mental health. Internal reliability of the MHI-5 has been reported at $\alpha = .78$ to .87 in studies across eleven countries (Gandek et al., 1998). While exact cut-off scores for predicting mental disorders are undetermined, studies have suggested that a score below 52 (Holmes, 1998) to 56 (Shaw et al., 2000) are indicative of major depression.

Childhood Factors

Childhood family dynamics were assessed by creating a CFD score which has been published previously (Craig, Morton, Morey, et al., 2018). The CFD score is made of six items which include: 1. "As a child, my parents showed me love"; 2. "As a child, my parents understood me"; 3. "While I was a child my family had a lot of fun"; 4. "As a child, my parents didn't trust me"; 5. "As a child, my parents didn't care what I did"; and, 6. "As a child, I enjoyed being at home with my family." Each item included five options ranging from "Strongly disagree" to "Strongly agree." Responses were coded from one to five and items 4 and 5 were then reverse coded so higher item values represented increasingly positive outcomes. Responses from each item were then summed to calculate an overall CFD score.

Adverse Childhood Experiences were assessed by creating an ACEs score developed by Felitti and associates (Felitti et al., 1998) which has been previously published (Craig, Morton, Morey, et al., 2018). Adverse childhood experiences including psychological, physical or sexual abuse, violence, parental substance abuse, parental separation/divorce, parental incarceration or death of a parent, close relative or friend has been linked with poor mental health in childhood through to adulthood (Kerker et al., 2015; Schilling, Aseltine, &

Gore, 2007). The ACEs score was created from nine items which include: 1. "One or both of my parents were in trouble with the law"; 2. "My parents were separated or divorced"; 3. "One or both my parents died"; 4. "One or both parents were absent from home for long periods"; 5. "There were times when family violence occurred"; 6. "There were times when I was physically abused"; 7. "There were times when I was sexually abused"; 8. "One or both parents smoked tobacco"; and, 9. "One or both parents drank alcohol weekly or more often." Each item included no/yes response options which were given a corresponding value of zero or one. Responses from each item were summed to calculate an overall ACEs score.

Religious affiliation was included in this study due to the special nature of the sample. As seen in Table 1, 46% of participants in this study reported being affiliated with the Seventh-day Adventist Protestant religion. Religious affiliation was assessed by asking the participants: "Which of the following best describes your religious belief now?" Options ranged from: 1. Seventh-day Adventist Christian; 2. Other Christian; 3. Other Religion; 4. No Formal Religion; and 5. Don't Know. For the purpose of this study, this item was dichotomized to Adventist (response 1) and not Adventist (responses 2–4).

Attitudes

Perceived social misfit status was measured with a single item that asked the participants to respond yes/no to the statement: "I often feel like a social misfit". The social misfit hypothesis (Wright et al., 1986) proposes that children who deviate from the social group norm and are different in some discernible way, whether it be in relation to behaviour or appearance, are often victimized, marginalized or bullied impacting their mental health. Meaning and purpose was measured with a single item that asked the participants to respond on a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" to the statement: "My life is filled with meaning and purpose". Attitudes surrounding meaning and

purpose have been found to be associated with adolescent mental health (Burrow et al., 2010) with adolescents reporting meaning and purpose more likely to experience better mental health (Brassai et al., 2011; Damon et al., 2003; Halama & Dědová, 2007a). School academic performance was measured by asking the students how they rated themselves at school work on a five-point Likert scale ranging from "A lot below average" to "A lot above average". Measuring school academic performance with this item has been used in previous studies and national surveys (Bowden et al., 2017b; Centre for Epidemilogy and Research NSW Department of Health, 2008; The Cancer Council Victoria, 2006).

Selected Health Behaviours

Fruit and vegetable intake was assessed using food frequency questions adapted from items previously used in studies of adolescent cohorts (Kolodziejczyk et al., 2012). Fruit consumption was measured by an item that asked: "How many serves of fruit do you usually eat each day? (1 serve = 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces)". Response options ranged from "I do not eat fruit" to "6 serves or more". Vegetable consumption was measured by an item that asked: "How many serves of vegetables and salad vegetables (excluding potatoes) do you usually eat each day? (1 serve = 1/2 cup of cooked vegetables or 1 cup of salad vegetables)". Response options ranged from "I do not eat vegetables" to "6 servers or more". The fruit and vegetable items were summed to provide an overall fruit and vegetable intake score. Physical activity was measured by an item that asked: "How many times per week do you usually do any vigorous or moderate physical activity for at least 30 minutes?" with seven response options ranging from "none" to "6 or more times" (Giffin et al., 2004). Sleep quantity was assessed by an item that asked: "How many hours do you usually sleep per night?" with eight response options ranging from "3 hours or less" to "10 hours or more".

Analysis

The objective of this study was to examine the direct and indirect predictors of adolescent MHS by employing structural equation modeling (SEM). A hypothesized model informed by the literature and theoretical models (AIHW, 2012f; Kieling et al., 2011) was developed (see Figure 1) for analysis. In order to concomitantly explore factors associated with MHS yet retain a parsimonious model, the study was delimited by restricting explanatory variables as follows: As shown in Figure 7, the most proximal explanatory variables in the model were the health behaviours (fruit and vegetable consumption, physical activity and sleep quantity). Antecedent to the health behaviours were attitudes (perceived social misfit status, meaning and purpose in life and school academic performance). Childhood factors (CFD, ACEs and religious affiliation) were arranged in the model as the most distal predictors.
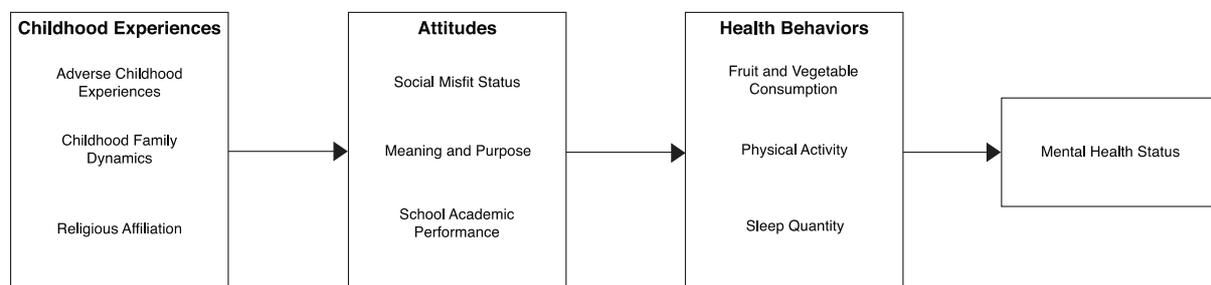
Figure 1. Hypothesised model predicting mental health status

The data was imported into SPSS (version 24; IBM, Armonk, NY) to calculate means, standard deviations, distributions and internal reliability. Structural equation modelling using AMOS (Versions 24; Amos Development Corporation, Crawfordville, FL, USA) was conducted using techniques developed by Jöreskog and Sörbom (1989). This involved an iterative process of inspection of the statistical significance of path coefficients and

theoretical relevance of the constructs in the model to derive an optimal SEM that best fit the dataset and was theoretically meaningful.

Overall model fit was examined using multiple goodness-of-fit indices, namely: relative X^2 (CMIN/DF), baseline comparisons fit indices of NFI, RFI, IFI, TLI, CFI, and RMSEA. Bootstrapping (Preacher & Hayes, 2008) was applied to verify statistical significance of indirect and total effects at $p < .05$. Multi-group analysis was employed to test for gender variations among the pathways in the study as gender has been observed to moderate the relationship of predictors on adolescent mental health (Craig, Morton, Morey, et al., 2018; Mission Australia, 2017; Patel et al., 2007). The critical ratios for differences test was applied to assess for regression weight differences for gender within the SEM (Ho, 2013).

Results

Descriptive Statistics

A summary of descriptive statistics and reliability estimates is shown in Table 3. The mean mental health score was 65 and was significantly higher among the males than the females (67.7 ± 16.6 versus 63.2 ± 18.3, $p < .001$). There was no significant difference ($p = 0.11$) in the mental health score of the respondents affiliated with the Adventist church (66.1 ± 17.5) compared to those who were not (64.6 ± 18.0).

Table 1. *Descriptive Statistics and Scale Reliability of Variables Used in the Analysis*

Variables	N	%	Mean	SD	Min	Max	Scale Reliability (α)
Age	1527		14.56	± 1.57	12	18	
Gender							
Males	838	54.9%					
Females	689	45.1%					
Adverse Childhood Experiences							
Score	1527		1.39	± 1.65	0	9	.69
Childhood Family Dynamics							
Score	1527		24.21	± 4.82	5	30	.84

Religious Affiliation							
Adventist	698	45.7%					
Not Adventist	829	54.3%					
Perceived social rejection							
No	1295	84.8%					
Yes	232	15.2%					
Meaning and Purpose	1527		3.94	± 1.02	1	5	
Self-rated school academic performance							
A lot below average	13	0.9%					
Below average	84	5.5%					
Average	722	47.3%					
Above average	595	39.0%					
A lot above average	113	7.4%					
30 min or more sessions of MVPA per week	1527		3.28	± 1.18	0	6	
Serves of fruit and vegetables per day	1527		5.14	± 2.34	0	12	
Sleep hours per night	1527		7.94	± 1.13	3	10	
Mental Health Scale	1527		65.26	± 17.76	4	100	.75

Abbreviations: α = Cronbach's alpha

Model Predicting Mental Health Status

The final structural model (Figure 8) fitted the data well, as indicated by the goodness-of-fit indices (CMIN/DF=1.854; NFI=0.993, RFI=0.967; IFI=0.997; TLI=0.985, CFI=0.997 and RMSEA=0.024). CMIN/DF statistic below three is considered good model fit (Kline, 2010) as are baseline comparisons fit indices above 0.9 (Bentler, 1990). The RMSEA value was less than 0.06, which indicated a close fit between the data and the model (Hu & Bentler, 1999). The squared multiple correlation calculated for MHS of 0.30 indicates that the model explained 30% of the variance for MHS. Standardized path coefficients are presented as single-headed arrows in the final model. All shown paths are statistically significant including all indirect and combined total pathways.
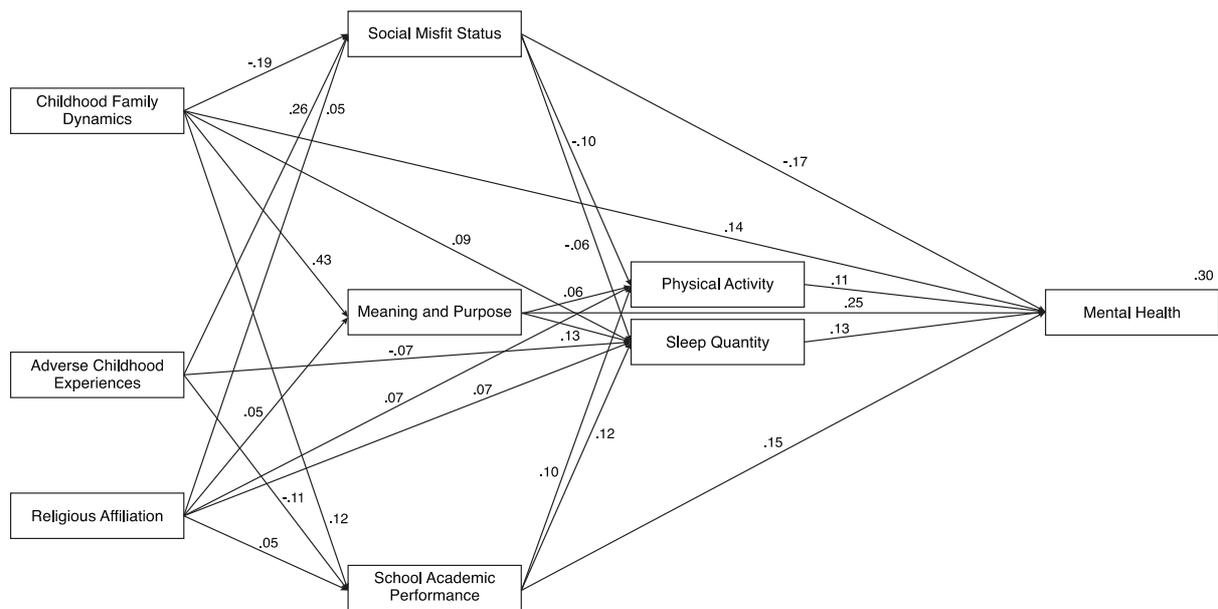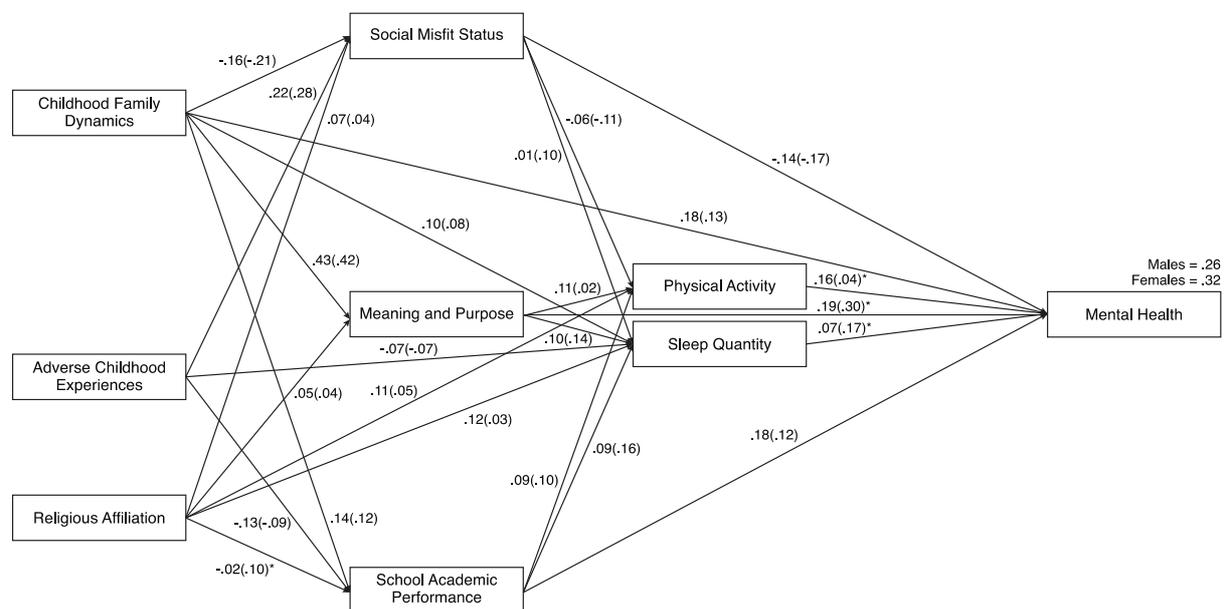
Figure 2. Structural equation model predicting adolescent mental health

Based on standardized path weight coefficients (β's), the item measuring meaning and purpose had the strongest direct association (β = 0.25) with MHS followed by perceived social misfit status (β = -0.17), school academic performance (β = 0.15), the CFD score (β = 0.14), sleep quantity (β = 0.13) and physical activity (β = 0.11). Combining direct and indirect effects, the CFD score (β_{total} = 0.33) was the strongest predictor of MHS followed by the item that measured meaning and purpose (β_{total} = 0.27), perceived social misfit status (β_{total} = 0.19), school academic performance (β_{total} = 0.18), ACEs (β_{total} = -0.08) and religious affiliation (β_{total} = 0.03). The combined beta of all three attitudes measured in the model was 0.64.

Multi-group analysis for gender (Figure 9) found a significant difference in the path coefficient between physical activity and MHS, with this association stronger for males (β = 0.16) than for females (β = 0.04). A significant difference in the path coefficients between sleep quantity and MHS was also observed, with this association stronger for females (β =

0.17) than for males (β = 0.07). Significant differences in path coefficients for gender were also found between life has meaning and purpose and MHS, with this association stronger for females (β = 0.30) than for males (β = 0.19). Finally, significant differences in path coefficients for gender were found between religious affiliation and school academic performance, with this association stronger for females (β = 0.10) than for males (β = -0.02).

Males(Females); * Significant difference between males and females at p < .05

Figure 3. Structural equation model multi-group analysis for gender

Discussion

This study explored the effect of a complex network of factors on the metal health status of adolescents attending Adventist schools in Australia. The study was unique in that it concomitantly measured the relationship within this cohort between MHS childhood factors, attitudes and select health behaviours.

The association of meaning and purpose with the MHS of the adolescents in this study is in line with findings from other studies (Brassai et al., 2011; Damon et al., 2003; Halama & Dědová, 2007a). Indeed, discovering purpose is a clear marker of flourishing and positive well-being (Burrow et al., 2010) in adolescents and a lack of meaning and purpose has been linked to depression, apathy and social and interpersonal difficulties (Damon et al., 2003). The finding that meaning and purpose had the strongest direct association with MHS (β = 0.25) of all the variables measured in the model suggests that developing meaning and purpose is an important predictor of MHS in this cohort. Developmental theorist Erikson (Erikson, 1968) proposed that actualizing purpose and meaning early in life is important to help adolescents resolve identity crises and hence promote positive development throughout the lifespan. Erikson suggested that engaging adolescents in activities that empower expression of their inner selves enables them to determine goals and values that shape their identity, meaning and purpose. Exploring cultural rites of passage that provide adolescents with activities intended to define them as adults with a larger sense of meaning and purpose may also have a positive association with MHS (Van Dyke & Elias, 2007). The finding in this study that CFD was associated with meaning and purpose suggest that positive CFD assisted the adolescents in this study to find meaning and purpose.

The association of perceived social misfit status with MHS in this study is consistent with other reports (Leary, 2015; Masten et al., 2012). Adolescents may be more vulnerable to social rejection than both adults and younger children (Kloep, 1999) due to increased peer influence susceptibility (Erikson, 1968). The social misfit hypothesis (Wright et al., 1986) proposes that children who deviate from the social group norm and are different in some discernible way whether it be in relation to behaviour or appearance, are often victimized, marginalized or bullied. These findings provide impetus for exploring strategies to reduce experiences of social rejection among adolescents which may improve their MHS. Programs

and interventions that focus on growing interpersonal skills such as healthy relationship development, understanding boundaries, community building, acceptance (including acceptance of minorities and differences), group/clique inclusiveness, prosocial behaviour (Wright et al., 1986) and antibullying, are important considerations for promoting the MHS of adolescents. For recipients of social rejection, therapies targeting forgiveness and building resilience may be valuable (Van Dyke & Elias, 2007).

Although the association of mental health and school academic performance has been extensively discussed (McLeod et al., 2012), little research has looked at the reverse relationship—school academic performance as a predictor of mental health. The finding in this study that school academic performance was associated with MHS extends the findings of a previous study linking school academic performance and depression in females but not males (McCarty, 2008). An Australia study (Mission Australia, 2017) reported that school academic performance is one of the key issues adolescents are concerned about, even more so than body image, and hence poor mental health may be mediated by stress associated with poor school academic performance (Cole, 1991).

The combined beta of all three attitudinal variables in the model with MHS was 0.65 with a medium effect size (f-square 0.16). The attitudinal variables explained 37% of the variance in MHS. This finding extends the work of a previous study (Craig, Morton, Morey, et al., 2018) linking childhood experiences with MHS. This finding highlights the collective impact of these three factors on MHS and indicates that interventions that jointly target meaning and purpose, social rejection and school academic performance may be of value in improving the MHS of adolescents.

An important observation of this study was the effect of upstream childhood factors on MHS. While the association between CFD and MHS in adolescence is well-documented in the

literature (Craig, Morton, Morey, et al., 2018; Patton, Coffey, et al., 2014), its importance is highlighted in the present study as CFD had the strongest association ($\beta_{total} = 0.33$) with MHS of all the variables in the model. It is noteworthy that CFD interacted with four other variables in the model including social rejection, meaning and purpose, academic performance and sleep quantity. The finding that ACEs was not directly associated with MHS is counterintuitive and surprising as this association was found in other studies and theory (AIHW, 2012f; Craig, Morton, Morey, et al., 2018). This result may be due to the strong mediating effect of the present attitudes included in the model. Indeed, finding meaning and purpose, improving school academic performance and addressing social misfit status may dampen the effect ACEs may have on MHS directly. Adverse childhood experiences did have an indirect effect on MHS through perceived social misfit status, school academic performance and sleep quantity. These findings support the necessity for early interventions and prevention programs that promote positive CFD, namely positive parent child relationships and family enjoyment, focusing in particular on providing skills and support to parents and guardians (Patel et al., 2007).

This cohort was selected as approximately half of the adolescents who attend Adventist schools identify as Adventist. Further, these Adventist adolescents have been shown to practice better health behaviours and experience better health outcomes than the non-Adventist adolescents attending these schools (Craig et al., 2017; Craig, Morton, Kent, et al., 2018). The weak association observed between religious affiliation and other variables in the model is interesting and in relation to mental health may suggest that this population are not atypical.

The multi group analysis in this study resulted in several significant pathway differences for gender. The stronger association between meaning and purpose and MHS for females

compared to males is consistent with the findings of other studies (Brassai et al., 2011). This suggests that meaning and purpose functions differently as a protective factor for female and male adolescents. A greater emphasis on interventions designed to enhance meaning and purpose as a protective factor for MHS in females without neglecting males may be worth considering. The findings of this study also suggest that physical activity is more protective of MHS for males and sleep quantity is more protective of MHS for females. A difference in emphasis in intervention and prevention programs among genders would be appropriate whereby more emphasis is placed on physical activity for males and sleep quantity for females when implementing interventions and prevention initiatives to improve MHS.

The strength of this study is that it was able to concomitantly measure and describe the effect of multiple factors on MHS in adolescents including past childhood experiences, present attitudes and selected health behaviours on MHS. A limitation of the study is that it was cross-sectional therefore causation cannot be determined. Although the model presented is strong, it is acknowledged that other factors also predict MHS. Future studies may consider the inclusion of biological, psychological, socioeconomic, and societal factors to further understand their influence on MHS (Patel et al., 2007). In addition, asking adolescents to retrospectively report their CFD may introduce bias into the data with adolescents currently experiencing poor MHS possibly reporting more negative CFD. Assessing social misfit status may be improved in future studies with peer or teacher reporting in conjunction with self-reports (Bellmore, Witkow, Graham, & Juvonen, 2004; Wright et al., 1986). Although the theoretical frameworks driving this study provide the basis for exploring the pathways presented in the model, it is acknowledged that some predictors may just as well be explained in reverse. Poor MHS for example may predict adolescent's having more difficulty finding meaning and purpose or poor school academic performance (McLeod et al., 2012). Another limitation of this study is that it focused on adolescents attending Adventist schools which

belong to the private sector. While the Adventist schools draw students from many socioeconomic statuses, further studies in public schools are required to determine the generalizability of findings. Noteworthy, approximately 40% of adolescents in Australia attend private schools (ABS, 2017).

Conclusion

This study presents a model describing a complex network of factors predicting the mental health status of adolescents attending a faith-based school system in Australia. The results confirm the effect of early childhood family dynamics, having a sense of meaning and purpose, social misfit status and school academic performance on the mental health status of adolescents. The findings support the need for gender appropriate multi-component approaches when developing effective interventions and prevention programs to promote positive mental health among adolescents, with an emphasis on the discovery of meaning and purpose during adolescence and early positive childhood family dynamics.

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