An Examination of both Linear and Non-Linear Associations of Adolescent Alcohol Consumption as a Risk Factor for Psychological Distress and Depressive Symptoms

by

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This thesis is dedicated to my dear friend, Kerry Arrow, who passed away on 6 December 2016. I will always fondly remember all the time we spent working on our theses together. You believed in my ability to complete my thesis even when I had lost hope. You have been a pillar of support to me throughout both my academic and personal journey. Without your support, this thesis would not have been possible.

“Those we love don’t go away, they walk beside us every day... unseen, unheard, but always near, still loved, still missed and very dear.” – Author unknown
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This thesis used data from the Victorian Adolescent Health and Wellbeing Survey and the Australian arm of the International Youth Development Study. For both projects data was collected by The Centre for Adolescent Health, Murdoch Children’s Research Institute. I am grateful for the opportunity to utilise two rich and comprehensive datasets in my thesis.

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<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>AIC</td>
<td>Akaike information criterion</td>
</tr>
<tr>
<td>AUD</td>
<td>Alcohol use disorder</td>
</tr>
<tr>
<td>BAC</td>
<td>Blood alcohol concentration</td>
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<tr>
<td>BIC</td>
<td>Bayesian information criterion</td>
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<tr>
<td>CTC</td>
<td>Communities That Care</td>
</tr>
<tr>
<td>DEECD</td>
<td>Department of Education and Early Childhood Development</td>
</tr>
<tr>
<td>DSM-5</td>
<td>Diagnostic and Statistical Manual of Mental Disorders - 5th Edition</td>
</tr>
<tr>
<td>DALY</td>
<td>Disability-adjusted life years</td>
</tr>
<tr>
<td>ICC</td>
<td>Intra-class correlation</td>
</tr>
<tr>
<td>IYDS</td>
<td>International Youth Development Study</td>
</tr>
<tr>
<td>MDD</td>
<td>Major depressive disorder</td>
</tr>
<tr>
<td>MDE</td>
<td>Major depressive episode</td>
</tr>
<tr>
<td>MLM</td>
<td>Multilevel modelling</td>
</tr>
<tr>
<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>YLD</td>
<td>Years of life lost to disability</td>
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<tr>
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Abstract

Nationally and internationally, depression and alcohol use in adolescence are major public health priorities. They often emerge and can co-occur in adolescence. Even at sub-clinical levels, both are strong predictors of similar problems in adulthood. This pattern of development suggests these behaviours have their origins in adolescence; as such, prevention and early intervention may reduce these problems across the lifespan. Evidence indicates there is a reciprocal relationship between alcohol consumption and depression in adolescence, thus an increase in one outcome is associated with an increase in the other. However, depression as a risk factor for alcohol consumption (the self-medication hypothesis) has received considerably more attention within the literature than the reverse hypothesis. The reverse hypothesis that postulates alcohol consumption may increase the risk of developing depression has received less research attention.

This thesis focuses on non-clinical alcohol consumption and depression, as sub-clinical levels have a high prevalence in adolescence and are linked with poorer developmental trajectories. The aim of this thesis is to examine more deeply the relationship between non-clinical alcohol consumption as a predictor of depressive symptoms during adolescence. In particular, the thesis examines linear and non-linear associations between alcohol consumption and depressive symptoms, and whether the association is moderated by age and biological sex.

Bronfenbrenner’s Ecological Systems theory (1979) was used as an organising framework. Bronfenbrenner argued that human behaviour is influenced by a variety of factors in the environment, both proximal and distal. This thesis presents a literature review of risk and protective factors for adolescent depression, including a comprehensive review of 18 studies that have examined alcohol consumption as a predictor of psychological distress and depressive symptoms in adolescence.
Following are two empirical studies examining the association between alcohol consumption and depressive symptoms. Study 1 used a large representative sample of Australian adolescents \( N = 10,165 \) from the state of Victoria. It examined the association between non-clinical alcohol consumption as a predictor of psychological distress in adolescence. This study analysed existing cross-sectional data from the Victorian Adolescent Health and Wellbeing Survey collected in 2009. The dataset comprised 49% male participants aged 11 to 17 \( (M = 14.4, SD = 1.64) \). Multilevel modelling (MLM) was used to analyse the data. Analyses controlled for known risk factors for adolescent depression that may confound the association between alcohol consumption and psychological distress.

In Study 1, non-linear effects were not identified. However, the study identified a significant two-way interaction between age and alcohol consumption on psychological distress symptoms. The probability of drinkers developing psychological distress declined with age: 11-year-olds (84%), 12-year-olds (67%), 13-year-olds (52%), 14-year-olds (39%), 15-year-olds (26%), 16-year-olds (15%) and 17-year-olds (4%). However, as the study used a cross-sectional design, it was not possible to examine the temporal nature of this association.

Using a longitudinal design with two waves of data, Study 2 investigated the temporal association between non-clinical alcohol consumption at Time 1 as a predictor of depressive symptoms at Time 2. This study examined two waves of existing data from the Australian arm of the longitudinal International Youth Development Study (IYDS) collected in 2002 and 2003. This dataset comprised a representative sample of 2,835 adolescents (48% males) with three year level cohorts: youngest \( (M = 10.98, SD = 0.40) \), middle \( (M = 12.93, SD = 0.41) \), and oldest \( (M = 14.89, SD = 0.39) \). Retention rates across the two waves were high (98.65%). MLM was also used to analyse the data.
Analyses controlled for baseline depressive symptoms, age, biological sex and other known risk factors for adolescent depression. The results from Study 2 demonstrated that adolescents who consumed alcohol at Time 1 were at increased risk of depressive symptoms one year later. The results, however, suggested a curvilinear association that was characterised by a steeper increase in depressive symptoms between no drinking and drinking on one or two occasions at Time 1. With further increases in drinking frequency, depressive symptoms appeared to plateau. The association followed a curvilinear pattern for both males and females; however, the changes in depressive symptoms were higher on average among females. These results suggested that early alcohol consumption increases the risk of depressive symptoms in a non-linear fashion.

Overall, the current thesis findings provide support for the reverse hypothesis at non-clinical levels of alcohol consumption. The findings indicate that developmental trajectories of alcohol consumption may be associated, in a non-linear way, with increases in depressive symptoms. The results also suggest that, particularly in early adolescence, non-clinical alcohol use may be more strongly associated with psychological distress symptoms. These findings have important clinical implications for prevention and demonstrate that normative drinking behaviour is associated with an increased risk of depression in adolescence. The clinical implications, strengths and limitations of the studies, and future research directions are discussed.
**Thesis Overview**

Adolescence is a critical developmental period for the onset of mental health problems (Kessler et al., 2005; Kim-Cohen et al., 2003) and the initiation of alcohol use (White & Bariola, 2012). When occurring in adolescence, these health-related problems can increase the risk of similar problems in adulthood (DeWit, Adlaf, Offord, & Ogborne, 2000; Grant, Stinson, & Harford, 2001; Hawkins et al., 1997; Kim-Cohen et al., 2003; McBride, Cheng, Slade, & Lynskey, 2016; Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). Alcohol consumption and depression also frequently co-occur in adolescence (Kandel et al., 1999; Salom et al., 2016). Previous research has predominantly focused on the self-medication hypothesis, which proposes that depression precedes alcohol consumption (Khantzian, 1997). Less is known about the reverse hypothesis, which postulates that alcohol consumption increases the risk of developing depression. Emerging evidence provides support for the reverse hypothesis in adolescence (Clark et al., 2007; Edwards et al., 2014a; Fleming, Mason, Mazza, Abbott, & Catalano, 2008; Owens, Shippee, & Hensel, 2008; Verdurmen, Monshouwer, Dorsselaer, Bogt, & Vollebergh, 2005). However, a more in-depth examination of the nature of this association is needed. This information is important for the prevention and early intervention of depression in adolescence.

**Research Questions**

The primary aims of this thesis were to examine in greater depth the linear and non-linear associations of alcohol consumption as a risk factor for depression in adolescence, with a specific focus on examining interactions with age and biological sex. This was examined in two empirical studies. The first study used a cross-sectional design of Australian adolescents from the state of Victoria ($N = 10,165$) to examine the association between non-clinical
alcohol consumption and psychological distress, a concept closely related to depression.

Study 1 addressed three research questions (RQ):

RQ1: Is the association between non-clinical levels of alcohol consumption as a predictor of psychological distress non-linear?

RQ2: Is the association between non-clinical levels of alcohol consumption as a predictor of psychological distress moderated by age?

RQ3: Is the association between non-clinical levels of alcohol consumption as a predictor of psychological distress moderated by biological sex?

The second study used a longitudinal dataset of Australian adolescents from the state of Victoria (N = 2,835) to examine the temporal association between alcohol consumption and depressive symptoms one year later. This study aimed to replicate the findings from Study 1 with a longitudinal design. Study 2 addressed three similar research questions:

RQ1: Is the temporal association between non-clinical alcohol consumption at baseline as a predictor of depressive symptoms one year later non-linear?

RQ2: Is the temporal association between non-clinical alcohol consumption as a predictor of depressive symptoms one year later moderated by age?

RQ3: Is the temporal association between non-clinical alcohol consumption as a predictor of depressive symptoms one year later moderated by biological sex?

Chapter Summary

This thesis explores the aforementioned research questions in eight chapters. Chapter 1 introduces the concepts of adolescent development, mental health problems and alcohol consumption. It describes the major features, prevalence and impact of psychological distress, depression and alcohol consumption, which are the key variables in this thesis. This chapter
concludes by discussing the high co-occurrence between depression and alcohol consumption in adolescence, and highlights prominent theories that attempt to explain the co-occurrence between these two health-related problems.

Chapter 2 presents a developmental framework for considering the research questions posed in this thesis. This chapter introduces Bronfenbrenner’s Ecological Systems theory (1979) and the concept of risk and protective factors. After describing the developmental framework proposed for preventing depression (National Research Council and Institute of Medicine of the National Academies [NRCIM], 2009) and the initiation of alcohol use (Masten, Faden, Zucker, & Spear, 2009), an argument is presented for using this framework for research that examines the co-occurrence of alcohol consumption and depression in adolescence.

Chapter 3 provides a critical appraisal of the risk and protective factors associated with adolescent depression. The factors are organised into domains (individual, family, school and community) as guided by Bronfenbrenner’s Ecological Systems theory (1979). The risk and protective factors identified in this chapter are used to guide the selection of covariates in the empirical studies.

Chapter 4 presents a literature review of 18 studies that have examined alcohol consumption as a risk factor for depression in adolescence. This review identified three key gaps within the extant literature: (1) few studies have examined whether the association is non-linear in adolescence; (2) it is unclear whether age moderates the association; and (3) there are mixed findings regarding whether the association differs between males and females. The two empirical studies within this thesis aimed to address these limitations within the literature.
Chapter 5 provides a general overview of the two datasets used within this thesis. Study 1 used the Victorian Adolescent Health and Wellbeing Survey and Study 2 employed the Australian arm of the International Youth Development Study (IYDS). Descriptions are kept brief in this chapter to avoid repetition in later chapters, which present the detailed methodology for each study. This chapter also describes the rationale for adopting a MLM analytical approach and provides a brief description of this analysis technique.

Chapter 6 presents the details and findings of Study 1. In keeping with the evidence reviewed in preceding chapters, it was hypothesised that the shape of the association between alcohol consumption as a predictor of psychological distress would be non-linear after controlling for age, biological sex and other risk factors. The results indicated that alcohol consumption was a significant predictor of psychological distress; however, the results did not support a non-linear association. It was hypothesised that alcohol consumption would be a stronger predictor of psychological distress in younger adolescents compared to older adolescents. This hypothesis was supported and results suggested that alcohol consumption in early adolescence was associated with greater increases in psychological distress compared to consumption in late adolescence. Due to the mixed findings within the literature, sex differences in the association were examined from an exploratory perspective. The study identified no significant differences in the association between males and females. A key limitation of this study was its cross-sectional design, which prevented inferences about the temporal nature of this association and therefore precluded conclusions regarding the reverse hypothesis.

Chapter 7 presents Study 2, which builds on Study 1 by addressing the thesis’s research questions in a longitudinal study. The hypothesis that non-clinical alcohol consumption would be a significant predictor of depressive symptoms one year later after adjusting for baseline depressive symptoms and other risk factors, and the hypothesis that this
association would follow a non-linear pattern, were both supported. Plotting the association revealed a curvilinear association, indicating that increases in depressive symptoms were not even between changes in drinking frequency at baseline. After steeper increases in depressive symptoms among adolescents at lower levels of consumption, increases in depressive symptoms appeared to plateau with further increases in drinking frequency one year later. The hypothesis that younger drinkers would be at greater risk of depression compared to older drinkers was not supported. The current study also did not identify significant differences in the association across sexes.

The final chapter provides a general discussion and conclusion of the entire thesis. To avoid repetition, it focuses only on the major findings of the thesis and is structured around the thesis’s three research questions. It discusses the key findings, clinical implications, and strengths and limitations of the thesis. It concludes with suggestions for future research.
Chapter 1: Introduction

Chapter Overview

This chapter introduces adolescent development and mental health problems, specifically psychological distress and depression. It describes the major features and prevalence of both psychological distress and depression, and the impact of mental health problems on adolescent developmental outcomes, families and the community. It also introduces adolescent alcohol consumption, presents the prevalence of adolescent drinking, and examines the impact of alcohol consumption on developmental outcomes. The chapter concludes by introducing the link between alcohol consumption and depression, which is the primary focus of this thesis.

Adolescent Development

The World Health Organization (WHO) defines adolescence as the transition period from childhood to adulthood that spans ages 10 to 19 (WHO, 2014). Adolescence is a critical developmental period that is characterised by rapid physical, biological, cognitive, psychological and social maturation (Ernst, Pine, & Hardin, 2006; Santrock, 2012). One of the most significant brain developments during adolescence is the maturation of the prefrontal cortex, which is responsible for cognitive control and executive functions such as decision-making and impulse inhibition (Luna, Padmanabhan, & O'Hearn, 2010; Spear, 2000). Throughout adolescence, reasoning abilities improve and the capacity for abstract thinking emerges (Piaget, 1971; Steinberg, 2005). Adolescents spend more time with peers and less time with their family, a tendency that supports self-identity development (Erikson, 1968; Sokol, 2009) but is also associated with increased risk-taking behaviour.

Internationally and in Australia, the leading causes of death among adolescents from developed countries are injury and poisonings, most commonly caused by road accidents,
accidental injury and self-harm (Australian Institute of Health and Welfare [AIHW], 2011; WHO, 2014a). In Australia, approximately one-third of all deaths among young people aged 12 to 24 years is attributable to road accidents and suicide (AIHW, 2011). Adolescence is also a time when most individuals first consume alcohol and other substances (Toumbourou, Hemphill, McMorris, Catalano, & Patton, 2009). Alcohol consumption is also involved in many injuries and deaths during adolescence (Newbury-Birch et al., 2009). While some risk-taking behaviour is a normal part of adolescence, some behaviours are associated with greater harms.

In addition to risk-taking behaviour, adolescence is also a period of vulnerability for developing mental health problems. Worldwide, depressive disorders are the leading cause of disability-adjusted life years (DALY) in female adolescents and the second leading cause in males (Gore et al., 2011). DALY is defined as ‘years lost to ill health or premature mortality’. In Australia, approximately 14% of adolescents experience mental disorders (Lawrence et al., 2015). Depressive and anxiety disorders are the most common among adolescents (Lawrence et al., 2015). Longitudinal studies suggest that between 50% and 78% of mental disorders emerge prior to adulthood (Kessler et al., 2005; Kim-Cohen et al., 2003). Adolescent mental disorders are one of the strongest predictors of mental health problems in adulthood (Aalto-Setala, Marttunen, Tuulio-Henriksson, Poikolainen, & Lonnqvist, 2014; Kim-Cohen et al., 2003; Patel, Flisher, Hetrick, & McGorry, 2007; Pine, Cohen, Cohen, & Brook, 1999). This evidence suggests there are age-related patterns to the onset of mental health problems and that adolescence is a critical period for the development of mental health problems across the lifespan.

Developmental theories suggest that substance use and mental health problems may both emerge during adolescence due to developmental changes (Steinberg, 2005, 2008). In early adolescence, puberty increases emotional intensity and sensation- and reward-seeking
behaviours. These changes precede the development of regulatory capacities within the prefrontal cortex, which continue to mature into late adolescence. It has been suggested that the different timings in the development of reward-seeking and regulatory capacities may make adolescents vulnerable to problems regulating emotions and behaviour (Dahl, 2001; Steinberg, 2005). These concepts will be elaborated in the next chapter.

**Defining Mental Health**

Mental health is defined by the WHO as an overall state of wellbeing that allows an individual to reach his or her own potential, cope with everyday stressors, and contribute positively to one’s community (WHO, 2010). Linked to the notion of poor mental health are mental disorders. In clinical terms, a mental disorder is defined as a set of clinically significant symptoms that identify psychological pathology (American Psychiatric Association, 2013). Mental disorders indicate dysfunction in a person's thoughts, emotion regulation, or behaviour, accompanied by distress, impairment in day-to-day functioning and/or an increased risk of injury or death (American Psychiatric Association, 2000, 2013).

**Mental health problems and public health.** Public health is a multidisciplinary field that draws on knowledge from many disciplines such as medicine, epidemiology, criminology, psychology and education (Baum, 2016). From a public health perspective, poor mental health is often referred to as ‘mental health problems’, a term used to refer to a broader concept, which encompasses sub-clinical symptoms, mental disorders and general mental health strain (WHO, 2004). The term ‘sub-clinical’ refers to emotional and behavioural symptoms that cause transient or enduring psychological distress or impairment in functioning but do not meet the full criteria of mental disorders (Angst, Sellaro, & Merikangas, 2000).

Sub-clinical symptoms may emerge prior to the onset of a full episode of a mental disorder. However, sub-clinical levels of mental health symptoms are associated with
impairment in functioning and are common during adolescence (Allen, Chango, Szwedo, & Schad, 2014; Costello, Mustillo, Erkanli, Keller, & Angold, 2003; Lewinsohn, Shankman, Gau, & Klein, 2004). Sub-clinical mental health problems during adolescence are a predictor of mental disorders in adulthood (Aalto-Setala et al., 2014; Angst et al., 2000; Pine et al., 1999). With mental health problems on the rise (WHO, 2012) and sub-clinical levels associated with impairment (Allen et al., 2014; Costello et al., 2003; Lewinsohn et al., 2004), recognising both sub-clinical and clinical levels of mental health problems is important for prevention and early intervention, particularly in adolescence.

In respect to the research questions, this thesis focuses on sub-clinical and clinical levels of depression, specifically examining whether non-clinical alcohol consumption increases the risk of adolescent depression. In this thesis, non-clinical alcohol consumption is defined as normative and high prevalence patterns of alcohol consumption that are common in adolescence. Study 1 examines the association between non-clinical alcohol consumption as a predictor of psychological distress, a concept closely related to depression. Study 2 examines this association with depressive symptoms. While the use of the same measures across both studies is desirable, the selection of measures was pre-determined as the current thesis utilises two large representative Australian school-based datasets. As both studies use non-diagnostic measures of mental health symptoms, it is likely that the current thesis captures both clinical and sub-clinical levels of psychological distress and depression. This is an important area of research as sub-clinical mental health problems and non-clinical alcohol consumption are high prevalence problems in adolescence. This research carries important implications for prevention and early intervention.

**Defining psychological distress.** Psychological distress is widely used as an indicator of mental health in epidemiological studies, clinical trials and in clinical practice (Drapeau, Marchand, & Beaulieu-Prevost, 2012). Psychological distress is defined as an emotional state
that is characterised by depressive and anxiety symptoms (Drapeau et al., 2012; Mirowsky & Ross, 1989, 2003). These symptoms commonly include feelings of tiredness, nervousness, hopelessness, restlessness, depression, loss of energy, sadness and worthlessness (Kessler et al., 2002). While not a distinguishing feature of standardised measures of psychological distress, this emotional state often adversely affects a person's daily and social functioning (Wheaton, 2007). The definition of psychological distress does not extend to personality traits, functional disabilities and behavioural problems, which are previous misconceptions in the definition of this concept (Drapeau et al., 2012). While psychological distress is not a diagnosable disorder, it is a key criterion in many mental disorders in current (American Psychiatric Association., 2013) and previous (American Psychiatric Association., 2000) diagnostic manuals. There is also evidence in both adult (Kessler et al., 2002) and adolescent (Green, Gruber, Sampson, Zaslavsky, & Kessler, 2010) samples that psychological distress is a reliable indicator that a person has a mental disorder, particularly a depressive disorder.

**Prevalence.** Epidemiological studies suggest a high prevalence of psychological distress during adolescence. Internationally, estimates of clinically significant psychological distress in adolescents range from 16% to 50% (Arbour-Nicitopoulos, Faulkner, & Irving, 2012; Balogun, Koyanagi, Stickley, Gilmour, & Shibuya, 2013; Huang, 2013; Mann et al., 2011). In Australia, the most recent epidemiological study indicated a high level of psychological distress with 29% of the sample experiencing moderate levels of psychological distress, 13% high levels and 7% very high levels (Lawrence et al., 2015). The rates of moderate and high levels of psychological distress were comparable across adolescents aged 11 to 15 years compared to 16 to 17 years. However, very high levels of psychological distress were significantly higher in older adolescents (11%) compared to younger adolescents (5%) (Lawrence et al., 2015).
Gender differences. Worldwide, females tend to experience higher levels of psychological distress compared to males (Drapeau et al., 2012; Myklestad, Røysamb, & Tambs, 2012). In Canada, national studies demonstrate that females are twice as likely to experience high to very high levels of psychological distress compared to males (Arbour-Nicitopoulou et al., 2012; Mann et al., 2011). In undeveloped countries, such as Botswana and the Philippines, females were more likely to experience psychological distress (Balogun et al., 2013). Similarly, in Australia, national data indicates that females report experiencing significantly greater levels of high (16%) and very high (9%) levels of psychological distress compared to males (high: 10%, very high: 6%) (Lawrence et al., 2015). Conversely, in China there were no gender differences in the prevalence of psychological distress (Huang, Xia, Sun, Zhang, & Wu, 2009).

Defining depression. Depression is a generic term used for a set of mood-related disorders (American Psychiatric Association, 2013). According to the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition) (DSM-5), a Major Depressive Episode (MDE) is characterised by depressed mood or loss of interest in almost all activities for two weeks or more, and at least four additional symptoms such as a disturbance in sleep, weight, attention/concentration or suicidal thoughts (American Psychiatric Association, 2013). In adolescents, irritability may be observed rather than depressed mood. To meet diagnostic criteria, the depressive episode must also cause clinically significant distress or impairment in daily functioning.

In the DSM-5, there are three main types of depressive disorders (American Psychiatric Association., 2013). Major depressive disorder (MDD) is classified as one (single episode) or more (recurrent episodes) major depressive episodes (MDE). Persistent depressive disorder (previously known as dysthymia) is characterised by a chronic and persistent depressed mood for at least at least one year in children or adolescents. Common
symptoms include changes in weight, sleeping difficulties, lack of energy, low self-esteem, reduced concentration and feelings of hopelessness (American Psychiatric Association, 2013).

Disruptive mood dysregulation disorder was introduced in the DSM-5 to account for children and adolescents who present with chronic mood dysregulation characterised by severe irritability. The primary features of this disorder are severe repeated temper outbursts characterised by verbal and/or physical aggression that is disproportionate to the trigger. These temper outbursts usually occur three or more times per week, and persist for at least 12 months. The DSM-5 also outlines substance-medication-induced depressive disorder and depressive disorder due to another medical condition to account for depressive episodes that are due to extraneous factors.

**Prevalence.** Epidemiological studies suggest that the prevalence of depression increases considerably in adolescence (Kessler, Avenevoli, & Merikangas, 2001). The rate of depression in pre-pubertal children is estimated to be approximately 1% in both US and Australian national epidemiological studies (Lawrence et al., 2015; Perou et al., 2013). In the US, national data estimated a 12-month prevalence of depressive disorders ranging between 2% and 8% in adolescents (Canino, Shrout, & Rubio-Stipec, 2004; Costello, Egger, & Angold, 2005; Costello et al., 2003; Roberts, Roberts, & Xing, 2007; Son & Kirchner, 2000). The most recent US epidemiological data identified that 10% of adolescents experienced a MDE in the past 12 months (SAMHSA, 2014). In Australia, national data suggests an overall prevalence of 7.7% for major depressive disorder in adolescents (Lawrence et al., 2015). The prevalence increased with age, rising from 5% in adolescents aged 11 to 15 years and 14% in adolescents 16 and 17 years of age (Lawrence et al., 2015).
Gender differences. Representative national data indicates that female adolescents report experiencing depression more than twice the rate of males in Australia, Canada, the UK and USA (Boyd, Gullone, Kostanski, Ollendick, & Shek, 2000; Wade, Cairney, & Pevalin, 2002). In the US, the most recent epidemiological data suggests that over the past year, 5.3% males and 16.2% females reported experiencing a MDE (SAMHSA, 2014). In Australia, national data indicates that 4.5% of male adolescents and 11% of females reported experiencing a MDD during the past year (Lawrence et al., 2015).

Impact of adolescent depression. Psychological distress and depressive disorders, including sub-clinical levels, have a significant impact on the lives of adolescents, their families and the community. Globally, depressive disorders are the leading cause of DALY among female adolescents and the second leading cause among male adolescents (Gore et al., 2011; WHO, 2014a). In Australia, mental health problems are the leading cause of disability among young people aged 15 to 24 years and account for nearly 50% of the burden of disease in this age group (AIHW, 2008). Depressive and anxiety disorders contributed to 17% of the burden of disease in males and 32% in females. In the most recent Australian epidemiological data, the majority of adolescents (aged 11 to 17 years) who suffered from MDD reported that they experienced some level of impairment in daily functioning: mild (39%), moderate (27%), and severe (34%) (Lawrence et al., 2015).

Likewise, adolescent depression is associated with reduced quality of life (Bastiaansen, Koot, Ferdinand, & Verhulst, 2004; Sawyer et al., 2002). Quality of life can be defined as the standard of health, social, educational and occupational wellbeing (Bastiaansen et al., 2004). In a three-year longitudinal study, the association between mental health and quality of life was examined in a sample ($N = 454$) aged 8 to 18 years (Rajmil et al., 2009). For this study, the greatest declines in the quality of life were observed in participants who developed mental health problems or experienced worsening mental health symptoms.
Studies have also shown that adolescents with mental health problems report a poorer quality of life compared to adolescents suffering from physical disorders such as asthma, epilepsy and diabetes (Rajmil et al., 2009; Sawyer et al., 2002).

Similarly, studies demonstrate that mental health problems are also associated with academic difficulties. Longitudinal studies have found that adolescents who experience mental health problems are more likely to skip school more frequently (Needham, Crosnoe, & Muller, 2004) and achieve poorer academic results (Fergusson & Woodward, 2002; McLeod, Uemura, & Rohrman, 2012; Needham et al., 2004). These adolescents are more likely not to complete high school (Fletcher, 2010; McLeod & Kaiser, 2004; Needham, 2009) and are subsequently less likely to pursue tertiary education (Fletcher, 2010; Needham, 2009). Psychological distress has also been found to increase the risk of failing at least one subject the following year (Needham et al., 2004). These academic consequences during adolescence are likely to have prolonged effects by limiting future study and career options, and therefore may reduce their future earning potential.

Perhaps the most serious consequence of mental health problems is suicide. Worldwide, suicide is a leading cause of death of people aged between 15 to 34 years (WHO, 2001). In Australia, suicide accounts for almost one-quarter of deaths in males aged 15 to 24 (Australian Bureau of Statistics [ABS], 2010). However, it is estimated that the rate of attempted suicide is 20 times higher than completed suicides within this age group (WHO, 2001). Depression is the most common mental disorder associated with completed suicide in adolescents (Beautrais, Joyce, & Mulder, 1998) and attempted suicide in adolescents (Beautrais, Joyce, & Mulder, 1998) in adolescents. Depression is a strong predictor of suicidal ideation (Gould et al., 1998; Reinherz et al., 1995). In a sample of adolescent outpatients diagnosed with a mental disorder, approximately 85% of adolescents reported suicidal ideation (Kovacs, Goldston, & Gatsonis, 1993). Suicide and deliberate self-
harm are also associated with high levels of psychological distress (Landstedt & Gadin, 2011).

Furthermore, the impact of adolescent mental health problems extends beyond the adolescent period. Longitudinal studies have identified that experiencing a mental disorder in childhood or adolescence is a strong predictor of recurrent episodes in adulthood (Ferdinand & Verhulst, 1995; Ferdinand, Verhulst, & Wiznitzer, 1995; Goodwin, Fergusson, & Horwood, 2004; Kim-Cohen et al., 2003; Lewinsohn, Rohde, Klein, & Seeley, 1999). Not only do childhood and adolescent mental disorders increase the risk of recurrent episodes, evidence shows that these individuals are also at greater risk of developing other mental disorders in adulthood (Copeland, Shanahan, Costello, & Angold, 2009; Kim-Cohen et al., 2003). Longitudinal studies have identified that this relationship is particularly strong for childhood and adolescent depression and anxiety disorders; as such, earlier episodes of depression increase the risk of later episodes of anxiety (Burke, Loeber, Lahey, & Rathouz, 2005; Copeland et al., 2009; Kim-Cohen et al., 2003; Moffitt et al., 2007; Pine, Cohen, Gurley, Brook, & Ma, 1998).

The impact of adolescent mental health problems also greatly affects families. Parents of children with a mental disorder reported increased stress, which was attributed to additional expenses, impact on other relationships, limited time for leisure activities and a decreased sense of wellbeing (Angold et al., 1998). Parents have also reported feelings of guilt, self-blame, constant worry about their child and a lack of knowledge about how to access help (Lewis, Bertino, Robertson, Knight, & Toumbourou, 2012). In an Australian study, findings indicated that caring for a child with a mental disorder had a greater impact on parents’ daily lives compared to parents of children with physical disorders or no disorder (Sawyer et al., 2002).
Adolescent mental health problems are also associated with high financial costs to the community. In the US, mental health problems in people aged 24 and under cost an estimated $247 billion annually (NRCIM, 2009). In 2009 in Australia, it was estimated that mental health problems in young people aged 12 to 25 cost the community $10.6 billion (Access Economic, 2009). Costs calculated in this estimate include costs associated with health expenditure, public health programs, health administration and health aids (Access Economic, 2009). A further $20.5 billion was spent in 2009 on disability and premature death associated with mental health problems within this age group.

**Alcohol Consumption and its Link with Mental Health**

**Alcohol.** Alcohol is a drug which at all levels of consumption has toxic effects on the body (Babor et al., 2010). As alcohol is a toxin, there are no absolute safe levels of consumption (NHMRC, 2009). However, in Australia and throughout the world, alcohol is frequently consumed during social gatherings, celebrations and commiserations. The consumption of alcohol takes many forms, including wine, beer, spirits and pre-mixed drinks (Babor et al, 2010). The sale of alcohol to children and adolescents is usually prohibited in most countries; however, paradoxically in many Western countries such as Australia, it is not illegal for children and adolescents to consume alcohol. In Australia, there is no legal drinking age although the purchase and possession of alcohol is prohibited before age 18. While Australian drinking guidelines discourage drinking before the age of 15, it is not illegal for a child to consume alcohol under their parent’s supervision. However, in the USA, people under the age of 21 are prohibited from purchasing and consuming alcohol.

**Prevalence.** Despite legislative restrictions and guidelines in most countries discouraging drinking before 18 years of age, the majority of individuals consume alcohol for the first time during adolescence (Steketee, Jonkman, Berten, & Vettenburg, 2013). In Europe, the average first use of alcohol is at 13 years of age in Northern European countries
and 12 years of age in other countries (Steketee et al., 2013). In the USA, approximately 60% of individuals first consume alcohol prior to age 18 (SAMHSA, 2014). In Australia, adolescents on average consume their first full alcoholic beverage at 15 years of age (AIHW, 2014).

Table 1 below compares four commonly used measures of adolescent alcohol consumption from three large epidemiological studies conducted in Europe, the USA and Australia. Overall, the epidemiological data suggests alcohol consumption in adolescence is a behaviour of high prevalence. As expected, as children get older, alcohol consumption increases. Comparisons between countries is difficult due to the use of different measurements of alcohol consumption at different ages.
Table 1

Summary of Epidemiological Studies Examining the Prevalence of Alcohol Consumption in Adolescent Samples

<table>
<thead>
<tr>
<th>Alcohol consumption measure</th>
<th>Country (Study)</th>
<th>N</th>
<th>Age</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifetime use:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any consumption in their lifetime.</td>
<td>Estonia (Steketee et al., 2013)</td>
<td>2,559</td>
<td>12 – 16 years old</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>Germany (Steketee et al., 2013)</td>
<td>3,428</td>
<td>12 - 16 years old</td>
<td>65%</td>
</tr>
<tr>
<td></td>
<td>Iceland (Steketee et al., 2013)</td>
<td>5,235</td>
<td>12 – 16 years old</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>Australia (White &amp; Bariola, 2012)</td>
<td>24,854</td>
<td>12 – 17 year olds</td>
<td>74%</td>
</tr>
<tr>
<td>Past year use:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any consumption in the past year.</td>
<td>Australia (White &amp; Bariola, 2012)</td>
<td>2,018</td>
<td>12-year-olds</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4,361</td>
<td>15-year-olds</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,907</td>
<td>17-year-olds</td>
<td>81%</td>
</tr>
<tr>
<td>Current use:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any consumption in the past 30 days.</td>
<td>USA (Johnston et al., 2015)</td>
<td>15,200</td>
<td>8th Graders</td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td>Australia (White &amp; Bariola, 2012)</td>
<td>13,300</td>
<td>10th Graders</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13,000</td>
<td>12th Graders</td>
<td>37%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2,018</td>
<td>12-year-olds</td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4,361</td>
<td>15-year-olds</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,907</td>
<td>17-year-olds</td>
<td>59%</td>
</tr>
<tr>
<td>Heavy drinking:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consuming five or more drinks during one occasion</td>
<td>USA (Johnston et al., 2015)</td>
<td>15,200</td>
<td>8th Graders</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Note: Measured over the past two weeks.</td>
<td>13,300</td>
<td>10th Graders</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Australia (White &amp; Bariola, 2012)</td>
<td>13,000</td>
<td>12th Graders</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Note: Measured over the past week.</td>
<td>2,018</td>
<td>12-year-olds</td>
<td>0.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4,361</td>
<td>15-year-olds</td>
<td>6.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,907</td>
<td>17-year-olds</td>
<td>18.5%</td>
</tr>
</tbody>
</table>
As shown in the table above, the prevalence of alcohol consumption is highest when measured over a longer duration; thus, substantially fewer adolescents consumed alcohol in the past month compared to the past year. This result suggests that some adolescents may consume alcohol infrequently, which is consistent with adolescence being a period of experimental use. However, data suggests that when adolescents do consume alcohol, it is often at risky levels (Johnston, O’Malley, Miech, Bachman, & Schulenberg et al., 2015; While & Bariola, 2012). Findings suggest that by middle to late high school up to one-fifth of adolescents had recently engaged in heavy drinking (Johnston et al., 2015; White & Bariola, 2012).

While rare in adolescence, repeated heavy drinking patterns can lead to Alcohol Use Disorder (AUD) (Kessler et al., 2007). AUD is a clinically diagnosed alcohol problem that is characterised by a need for greater levels of alcohol to achieve desired effects, accompanied by withdrawal, cravings and/or social consequences as a result of alcohol consumption (American Psychiatric Association, 2013). Epidemiological evidence from 28 countries indicates AUD rarely emerges in early adolescence and has a median age of onset between 18 to 29 years (Kessler et al., 2007). These findings suggest that non-clinical patterns of alcohol consumption, such as experimental use and less frequent heavy drinking are more prevalent in adolescence. In addition, heavy drinking in adolescence is associated with an increased the risk of AUD in early adulthood (DeWit et al., 2000; SAMHSA, 2013). This evidence will be discussed later in this chapter.

Gender differences. A large epidemiological study compared the prevalence of alcohol consumption for male and female students across two countries: the State of Washington DC, USA and the state of Victoria, Australia (Toumbourou et al., 2009). Table 2 below summarises the prevalence of past-year alcohol consumption, regular alcohol use and frequent heavy drinking for male and female students from these two states in USA and
Australia. Among younger students (Grade 5), a higher percentage of males tended to consume alcohol than females. In secondary school, however, the percentage of students regularly consuming alcohol and engaging in frequent heavy drinking is similar across sexes.

Table 2
Summary of the Results from Toumbourou and Colleagues Study (2009) Comparing the Prevalence of Alcohol Consumption in Australia and the USA

<table>
<thead>
<tr>
<th>Measure of alcohol consumption:</th>
<th>Country</th>
<th>N</th>
<th>Age</th>
<th>Prevalence</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past year: Any consumption in the past year.</td>
<td>USA</td>
<td>932</td>
<td>Grade 5</td>
<td>10%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Australia</td>
<td>922</td>
<td>Grade 5</td>
<td>34%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Regular use: More than three times in the past month.</td>
<td>USA</td>
<td></td>
<td>Year 7</td>
<td>3%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Year 9</td>
<td>9%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Australia</td>
<td></td>
<td>Year 7</td>
<td>11%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Year 9</td>
<td>24%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Frequent heavy drinking: Consuming five or more drinks during one occasion on three or more times in the past month.</td>
<td>USA</td>
<td></td>
<td>Year 7</td>
<td>0.5%</td>
<td>0.8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Year 9</td>
<td>2%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Australia</td>
<td></td>
<td>Year 7</td>
<td>3%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Year 9</td>
<td>7%</td>
<td>7%</td>
<td></td>
</tr>
</tbody>
</table>

Note. Adapted from "Alcohol use and related harms in school students in the USA and Australia," by J. W. Toumbourou et al., 2009, Health Promotion International, 24, p. 377. Copyright 2009 by the Oxford University Press.

For this same study, results showed there was a higher prevalence of alcohol consumption among Australian adolescents across all ages and sexes. For example, both male
and female Grade 9 students were more than twice as likely to consume alcohol regularly in the past month compared to adolescents in the USA. Similarly, for male and female Grade 7 and Grade 9 students, Australian adolescents were more than three times as likely to engage in frequent heavy drinking over the past month compared to adolescents in the USA.

**Impact of alcohol consumption.** Alcohol is classified as a depressant drug because when consumed at high doses, it has a depressant effect on the central nervous system, slowing reflex times and leading to poorer judgement and coordination (Edenberg, 2007). Table 3 below outlines the effects of alcohol on the body at different blood alcohol concentration (BAC) levels. When consumed at lower doses, alcohol can induce euphoric feelings (Roehrs & Roth, 2001). After an alcoholic beverage is orally consumed, the alcohol is quickly absorbed into the blood stream, in approximately 5 to 10 minutes (Lohr, 2005). The alcohol content within the blood stream usually reaches its highest levels between 30 to 90 minutes after consumption, having passed through all the organs in the body (Lohr, 2005).
Table 3

*The Effects of BAC Levels on the Body*

<table>
<thead>
<tr>
<th>BAC levels (mg/dL)</th>
<th>Effects on the body</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50 mg/dL</td>
<td>Minor impairment in motor coordination</td>
</tr>
<tr>
<td></td>
<td>Talkativeness</td>
</tr>
<tr>
<td></td>
<td>Feeling relaxed</td>
</tr>
<tr>
<td>50-150 mg/dL</td>
<td>Altered mood state</td>
</tr>
<tr>
<td></td>
<td>Impaired concentration and judgement</td>
</tr>
<tr>
<td></td>
<td>Sexual disinhibition</td>
</tr>
<tr>
<td>150-250 mg/dL</td>
<td>Slurred speech</td>
</tr>
<tr>
<td></td>
<td>Unsteady walking</td>
</tr>
<tr>
<td></td>
<td>Nausea</td>
</tr>
<tr>
<td></td>
<td>Double vision</td>
</tr>
<tr>
<td></td>
<td>Increased heart rate</td>
</tr>
<tr>
<td></td>
<td>Drowsiness</td>
</tr>
<tr>
<td></td>
<td>Altered mood</td>
</tr>
<tr>
<td></td>
<td>Aggressive and antisocial behaviour</td>
</tr>
<tr>
<td>300 mg/dL</td>
<td>Unresponsiveness</td>
</tr>
<tr>
<td></td>
<td>Memory loss</td>
</tr>
<tr>
<td></td>
<td>Vomiting</td>
</tr>
<tr>
<td></td>
<td>Heavy breathing</td>
</tr>
<tr>
<td>&gt; 400 mg/dL</td>
<td>Breathing stopped</td>
</tr>
<tr>
<td></td>
<td>Coma</td>
</tr>
<tr>
<td></td>
<td>Death</td>
</tr>
</tbody>
</table>

*Note.* BAC = blood alcohol concentration; mg/dL = milligrams per decilitre. Adapted from "Alcohol - the Body & Health Effects: A brief overview," by the Alcohol Advisory Council of New Zealand (ALAC), 2012, p. 7. Copyright 2012 by the ALAC.

The Australian alcohol guidelines recommend that children under the age of 15 abstain from alcohol consumption and that adolescents aged 15 to 17 years delay the first
drink for as long as possible (National Health and Medical Research Council [NHMRC], 2009a). This guideline is based on cross-sectional and longitudinal evidence that demonstrates children and adolescents are at the greater risk of harm from alcohol compared to any other age group across the lifespan. Alcohol-related harms are divided into short-term and long-term consequences (NHMRC, 2009a). Short-term consequences are defined as negative outcomes that occur during one occasion of alcohol consumption, such as injury or death (NHMRC, 2009a).

Long-term consequences are negative outcomes that are associated with the cumulative effects of prolonged alcohol use, such as alcohol-related diseases and cancers, which reduce the quality of life and may eventually lead to death (NHMRC, 2009a). As long-term health consequences develop over time, the chronic effects of adolescent alcohol consumption are not usually observed until adulthood (Newbury-Birch et al., 2009). However, alcohol consumption during adolescence is associated with the greatest risk for short-term consequences.

Adolescent alcohol consumption is associated with an increased risk of injury and death. A review study (N = 102 studies) identified that underage alcohol consumption was associated with higher levels of intoxication, accidental injury, traumatic brain injury, drowning, falls, burns, poisoning, homicide and suicide (Newbury-Birch et al., 2009). For example, a Canadian population-based cross-sectional study of secondary school students (N = 9288) indicated that consumption of alcohol in the past year significantly increased the risk of sustaining a traumatic brain injury in both males (OR = 1.80) and females (OR = 1.76) (Ilie et al., 2014). Similarly, in the USA, approximately 45% of all adolescent poisonings involved alcohol (Cheng, Wright, Person-Fields, & Brenner, 2006). In the USA, national data indicates that adolescent drinking is linked with increased risk of accidental injury, motor vehicle accidents, homicide and suicide (Miller, Naimi, Brewer, & Jones, 2007). In Australia,
approximately one adolescent (aged 14 – 17 years) dies and 60 are hospitalised each week due to alcohol-attributable injuries (Chikritzhs, Pascal, & Jones, 2004).

While it is difficult to study the specific effects of alcohol on the developing brain due to ethical reasons, evidence suggests that earlier alcohol consumption is associated with poorer cognitive functioning. In a cross-sectional study (N = 831), adolescents who had engaged in heavy drinking at least once in their lifetime demonstrated poorer impulse control and balance on neurocognitive testing compared to adolescents with no or low level drinking (Sullivan et al., 2016). In another cross-sectional study, magnetic resonance imaging was used to compare the brains of 14 adolescents (M age = 17) with AUD and 28 control participants (M age = 28) (De Bellis et al., 2005). Compared to control participants, adolescents with AUD had smaller prefrontal cortex volumes compared to control participants, which is the brain region involved in executive functioning. Longitudinal evidence suggests AUD in adolescence contributes to attention and memory difficulties (Brown & Tapert, 2004; White & Swartzwelder, 2005). Similarly, chronic alcohol use is associated with a smaller hippocampal volume in young adulthood (Zeigler et al., 2005).

While our understanding of the effects of alcohol on the developing brain is limited, current evidence suggests that regular heavy alcohol use in adolescence has negative implications for cognitive development and learning (Crews, He, & Hodge, 2007).

Adolescent alcohol consumption is also associated with an increased risk of social and educational consequences. Large national cross-sectional studies demonstrate that adolescents affected by alcohol are at greater risk of being both perpetrators and victims of violence (Fallu et al., 2006; Melzer-Lange, 1998; Newburn & Shiner, 2001; Shepherd, Sutherland, & Newcombe, 2006). Similarly, cross-sectional evidence suggests that alcohol consumption is associated with increased risky sexual behaviour (Bonomo et al., 2001; Coleman & Cater, 2005; Dye & Upchurch, 2006) and criminal activity in adolescence.
(French & Maclean, 2006) in adolescence. Longitudinal studies indicated that alcohol consumption increases the risk of poor academic performance, higher rate of absenteeism, and higher likelihood of dropping out of school (Chatterji & DeSimone, 2005; Ellickson, Tucker, & Klein, 2003).

While not common, there are significant long-term health consequences associated with early alcohol consumption. This risk increases the earlier a child has their first alcoholic drink (NHMRC, 2009). Long-term health consequences of alcohol consumption include an increase in the risk of cardiovascular disease, cancer, liver disease, diabetes, pancreatitis, oesophageal cancer, stroke and obesity (Baliunas et al., 2009; Corrao, Bagnardi, Zambon, & LaVecchia, 2004; Rehm, Room, & Taylor, 2008). Longitudinal evidence also indicates that early alcohol consumption, before age 15, significantly increases the risk of AUD (DeWit et al., 2000; Grant & Dawson, 1997).

**Alcohol consumption and depression.** The Australian alcohol guidelines for adolescents are also based on evidence indicating that alcohol consumption in adolescence is associated with increasing depressive symptoms. Large epidemiological studies have demonstrated a cross-sectional association where alcohol consumption is positively associated with depression, including psychological distress (Arbour-Nicitopoulos et al., 2012; Balogun et al., 2013; Coelho et al., 2014; Kandel et al., 1999; Myklestad et al., 2012; Poulin, Hand, Boudreau, & Santor, 2004; Salom et al., 2016; Verdurmen et al., 2005; Zinn-Souza et al., 2008). In a large Australian sample ($N = 7289$) of young adolescents aged 10 to 14 years, participants who consumed alcohol in the previous 30 days were almost twice (OR $= 1.80$) as likely to experience depressive symptoms than non-drinkers (Salom et al., 2016). At clinical levels of consumption, cross-sectional data ($N = 401$) indicates that mental disorders are more common among adolescents with a substance use disorder, of which alcohol use was the most common, than adolescents with no substance use disorder (Kandel
et al., 1999). Approximately 75% of adolescents with a substance use disorder also suffered from a comorbid mental disorder.

Furthermore, the Australian alcohol guidelines are also based on evidence that demonstrates that comorbid depressive symptoms and alcohol consumption are associated with poorer developmental outcomes. In a 14-year longitudinal study of adolescents assessed into early adulthood (N = 816), co-occurring alcohol use and mental health problems were found to significantly increase the risk of alcohol dependence, suicide attempts, life dissatisfaction and poorer functioning compared to either problem alone (Briere, Rohde, Seeley, Klein, & Lewinsohn, 2014).

Meta-analytical evidence indicates that mood disorders (OR = 13.42) and AUD (OR = 5.24) significantly increase the risk of suicide (Yoshimasu, Kiyohara, & Miyashita, 2008). A narrative review suggested that co-occurring alcohol use and depression is a high-risk profile for suicidal behaviour in adolescents (Galaif, Sussman, Newcomb, & Locke, 2007). Individuals with comorbid alcohol and mental health problems are less likely to seek treatment, and interventions are also less successful among this population (Grella, Hser, Joshi, & Rounds-Bryant, 2001; Kessler et al., 1996; Tomlinson, Brown, & Abrantes, 2004). In a clinical sample (N = 197) of adolescent outpatients diagnosed with MDD, adolescents who used alcohol excessively experienced a longer course and poorer psychosocial outcomes (Meririnne et al., 2010).

While the link between alcohol consumption and depression in adolescents is undoubtedly complex, the association could be explained by three non-mutually exclusive relationships. The shared aetiology hypothesis suggests that alcohol consumption and depression may co-occur due to shared underlying biological and environmental risk factors that increase the risk of both outcomes (Hasin & Grant, 2002; Monahan, Oesterle, Rhew, &
Hawkins, 2014; Wu, Hoven, Okezie, Fuller, & Cohen, 2008). A real-world example of this is child maltreatment, which simultaneously increases the risk of both depression (Fergusson & Lynskey, 1997; Harkness & Lumley, 2008) and alcohol consumption (Moran, Vuchinich, & Hall, 2004; Perkins & Jones, 2004) in adolescence.

The most popular theory within the literature is the *self-medication hypothesis* (Khantzian, 1990, 1997). This hypothesis postulates that individuals develop depressive symptoms first and then increase their alcohol consumption to provide temporary relief from symptoms. While there has been some support for the self-medication hypothesis in adolescent samples, results have been mixed (Crum, Storr, Ialongo, & Anthony, 2008; Edwards et al., 2014a; McCarty et al., 2012). For example, in an American sample of early adolescents (*N* = 1526) aged nine to 13 years followed over four years, higher levels of depressed mood was associated with an increased risk of alcohol initiation without parental permission in males but not females (Crum et al., 2008). Whereas, in a British longitudinal study (*N* = 7,100), elevated depressive symptoms between the ages of 12 to 17 years increased the risk of both normative alcohol consumption and harmful alcohol consumption at 18 years in females (Edwards et al., 2014b). However, the evidence did not support the self-medication hypothesis in males, in relation to either normative or harmful alcohol consumption. In a Finnish study (*N* = 1111) adolescents were followed over four years and results indicated that depressive symptoms at age 12 were not associated with increases in heavy drinking at age 15 (Kumpulainen & Roine, 2002). Perhaps the strongest evidence against the self-medication hypothesis comes from a 25-year longitudinal study of a New Zealand birth cohort (*N* = 1265) that examined different pathways between alcohol consumption and depression (Fergusson, Boden, & Horwood, 2009). Results suggested that the association between alcohol consumption and depressive symptoms, from late
adolescence into early adulthood, was best explained by a causal model in which alcohol consumption increased the risk of depression.

In contrast to the self-medication hypothesis, there has been considerably less attention for the reverse hypothesis, that alcohol consumption is associated with an increased risk of developing depression (Boden & Fergusson, 2011; Marmorstein, 2009). There is support for this hypothesis in both adult (Boden & Fergusson, 2011; Lembke, 2012) and adolescent samples (Edwards et al., 2014a; Fleming et al., 2008; Marmorstein, 2009; Owens et al., 2008; Rodriguez, Moss, & Audrain-McGovern, 2005; Skogen, Knudsen, Hysing, Wold, & Sivertsen, 2016). This increased risk for depression in adolescence following alcohol consumption could be due to the biological effects of ethanol on the developing brain (Spear, 2002, 2004). Alternatively, alcohol consumption in adolescence may cause academic or social consequences that increase the risk of depression. While the current thesis does not address the underlying mechanisms contributing to the association, it aims to further understand the reverse hypothesis. Developing a better understanding the nature of this association may have significant implications for public health interventions, particularly at lower levels of consumption, which is a normative behaviour in adolescence.

Conclusion

In summary, psychological distress, depression and alcohol consumption in adolescents are significant health concerns, both in Australia and internationally. These health-risk behaviours tend to first emerge in early adolescence and their prevalence increases substantially into late adolescence. Both depression and alcohol consumption, including sub-clinical levels, are associated with poorer developmental trajectories. There is a well-established positive correlation between depression and alcohol consumption in adolescents; as such, an increase in one outcome is associated with an increase in the other. Various explanations have been proposed to explain this positive association; however, the self-
medication hypothesis has received the most attention. Emerging evidence provides support for the reverse hypothesis, although much about this relationship remains unanswered. The current thesis aims to examine more deeply the relationship between alcohol consumption as a predictor of psychological distress or depression in adolescents.
Chapter 2: Developmental Framework

Chapter Overview

This chapter provides a developmental framework for considering the research questions posed in this thesis. The chapter describes a developmental framework proposed for the prevention of depression (National Research Council and Institute of Medicine [NRCIM], 2009) and alcohol initiation (Masten et al., 2009) in adolescence. The framework comprises four key components: age-related patterns, multiple contexts, developmental tasks, and interactions. This chapter then introduces the concept of risk and protective factors. Finally, this chapter concludes with an argument for considering the co-occurrence of alcohol consumption and depression from a developmental perspective.

A Developmental Framework to Prevention

Prevention science is a multi-disciplinary field that is defined as the “study of human development and social ecology as well as the identification of factors and processes that lead to positive and negative health behaviours and outcomes” (Biglan et al., 2011, p. 3). One of the major objectives of prevention is to improve public health by identifying modifiable factors and processes that lead to negative outcomes, and then targeting these factors in preventative interventions. Preventative interventions aim to promote and encourage healthy development (NRCIM, 2009). Therefore, it is important that a developmental framework underpin prevention efforts.

Developmental frameworks are useful for helping to understand and identify why behaviours emerge during particular periods in a person’s life (Hawkins, Catalano, & Miller, 1992). Development, as used in this thesis, refers to patterns of age-related changes that occur across the lifespan (Masten et al., 2009). While humans continue to develop throughout their lives, the most rapid and critical developmental changes occur during childhood and
adolescence. Many of these developmental changes have the potential to affect an individual’s risk of depression and alcohol initiation across the lifespan, particularly in childhood and adolescence.

A developmental framework has been put forward for understanding the changes that contribute to the onset of depression (NRCIM, 2009) and the initiation of alcohol use in adolescence (Masten et al., 2009). There are four main principles that underpin the developmental framework for prevention: age-related patterns, multiple contexts, developmental tasks, and interactions (Masten et al., 2009; NRCIM, 2009).

**Age-related patterns.** Healthy development is characterised by age-related intellectual, social-emotional and behavioural changes across the lifespan (NRCIM, 2009). For example, self-control increases with age during childhood and adolescence as the prefrontal cortex develops (Casey, Jones, & Hare, 2008). Unlike self-control, not all age-related developmental changes follow a linear pattern. For example, the development of the ability to recognise emotions in others follows a non-linear pattern (Ross, Polson, & Grosbras, 2012). Adolescence is a period of rapid developmental changes, second only to early childhood. Adolescence is characterised by rapid biological and social changes such as puberty and increased time spent with peers. Developmental changes in one phase affect future development; thus, developmental outcomes during adolescence influence health and social-emotional wellbeing outcomes in adulthood.

Epidemiological studies indicate there are age-related patterns associated with psychological disorders (Kessler et al., 2005). The majority of disorders have an age of onset prior to 24 years (Kessler et al., 2005). Depression is rare in childhood and often first emerges during adolescence, with prevalence increasing into early adulthood (Costello, Eranli, & Angold, 2006; Kessler et al., 2001). Onset of depression in adolescence, including
sub-clinical levels, is associated with recurrent episodes and a more severe course in adulthood (Aalto-Setala et al., 2014; Pine et al., 1999).

Similarly, the majority of individuals first consume alcohol during adolescence, although most individuals who go on to develop alcohol problems do not meet criteria for AUD until early adulthood (Briere et al., 2014; Kessler et al., 2005). In a prospective longitudinal study ($N = 816$), AUD at ages 16 to 17 predicted MDD in early adulthood ($R^2 = 0.10, p = < .05$) (Briere et al., 2014). Similarly, Australian longitudinal data suggested that drinking behaviour in adolescence predicts some drinking patterns in adulthood (Olsson et al., 2016). This study indicated that adolescent drinkers who experienced loss of control from drinking (OR = 1.9), engaged in binge drinking (OR = 2.0), or heavy binge drinking (OR = 2.3) were at increased risk of developing AUD in early adulthood (Olsson et al., 2016).

**Multiple contexts.** Developmental theorists argue that mental health and behavioural problems in adolescence are the result of a complex interplay between individual, family and environmental factors (Cicchetti & Toth, 1995; Glantz & Leshner, 2000; Price & Zwolinski, 2002). A widely accepted contribution to the developmental perspective of mental health (NRCIM, 2009) and alcohol consumption (Masten et al., 2009) is Bronfenbrenner's Ecological Systems theory (1977, 1979). This theory suggests that human development occurs in the context of individual, family and environmental factors that influence development. Bronfenbrenner posits that developmental outcomes are the result of a complex interplay between these factors. He organised the factors into five levels, beginning with the most proximal factors and moving out to the more distal factors. These are the microsystem, mesosystem, exosystem, macrosystem and chronosystem. Figure 1 illustrates Bronfenbrenner’s Ecological Systems theory.
As illustrated in the figure above, the individual is nested within the microsystem, which consists of the most direct influences, including their family, school, peers and neighbourhood. Nested within the microsystem, the individual directly interacts with this environment. The mesosystem describes the interactions between the different parts of the microsystem. For example, school and family interact, and these influences impact on the individual. Within the exosystem exist more distant influences, which may impact the individual indirectly. These influences include friends of family, neighbourhood and welfare services. The macrosystem comprises the individual's socio-cultural context, which indirectly influences the individual through community values, laws, culture, politics and economic climate. The chronosystem comprises the events, major life transitions and the changes over time within the other systems that occur throughout an individual's life.
**Interactions across levels of influence.** Human development is the result of complex interactions between factors from multiple contexts (Bronfenbrenner, 1979; Masten et al., 2009; NRCIM, 2009). As adolescents interact with many contexts, their development is shaped by many factors across the five systems. This includes the development of depression and alcohol initiation in adolescence, which is the result of complex interactions between many factors (Bond, Toumbourou, Lyndal, Catalano, & Patton, 2005). For example, longitudinal research identified a significant interaction between pubertal timing and peer problems (Winer, Parent, Forehand, & Breslend, 2016). In this study, peer problems were defined as playing alone, being bullied or disliked by peers. This study demonstrated that early puberty, coupled with a high level of peer problems were associated with a greater risk of developing depression. The risk of depression among adolescents experiencing high levels of peer problems was significantly lower for those with age-appropriate and late-onset puberty.

While much remains unanswered about the interactions between the many factors, evidence does suggest that as the number of risks within a child’s environment increases, so too does the likelihood of that individual developing depression and early alcohol initiation in adolescence. A large Australian cross-sectional (N = 8984) study demonstrated that as the number of risk factors in an adolescent’s environment increased, their risk for depressive symptoms also increased (Bond et al., 2005). The risk of depressive symptoms was low when the individual was exposed to zero to one risk factor and only slightly increased when the individual was exposed to two or three risk factors. However, the risk of depressive symptoms increased steadily with further increases in the number of risk factors the adolescent was exposed to. These findings suggest there is a complex interplay between risk factors that contribute to the development of depression in an individual’s life. This thesis
focuses on examining the interactions between alcohol consumption and age, and alcohol consumption and biological sex on depressive symptoms in adolescence.

**Developmental tasks.** As an individual grows, there are physical, cognitive and social-emotional developmental milestones that one achieves (Shaffer & Kipp, 2014; Wilks, Gerber, & Erdie-Lalena, 2010). While most typically achieve these developmental tasks within specific age ranges, developmental progress does vary across cultures (Van Ijzendoorn & Kroonenberg, 1988; Whiting & Whiting, 1975) and sexes (Ardila, Rosselli, Matute, Inozemtseva, 2011; Byrnes, Miller, Schafer, 1999; Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). Meeting expected developmental tasks is a predictor of healthy development (Masten et al., 2010; NRCIM, 2009). For example, developing a secure attachment style is associated with better language and cognitive development (Belsky & Fearon, 2002; Spiker, Nelson, Petras, Jolley, & Barnard, 2003) emotional regulation (Berlin & Cassidy, 2003; Lemche, Kreppner, Joraschky, & Klann-Delius, 2007) and social outcomes (Pallini, Baiocco, Schneider, & Madigan, 2014). Likewise, children who develop better emotional regulation skills experience more positive and successful social relationships (Calkins, Gill, Johnson, & Smith, 1999; Gilliom, Shaw, Beck, Schonberg, Lukon, 2002; Supplee, Skuban, Shaw, & Prout, 2009).

However, not all developmental tasks are associated with positive outcomes. While experimenting with alcohol has become a normative behaviour among adolescents in developed countries, this behaviour is associated with poorer developmental outcomes in a number of domains. Adolescents who consume alcohol are more likely to engage in risky behaviours, which increases their risk of permanent injury or death (Newbury-Birch et al., 2009). Alcohol consumption contributes to poorer academic performance and an increased risk of leaving school early (Chatterji & DeSimone et al., 2005; Ellickson et al., 2003). Heavy alcohol consumption in adolescence is also associated with poorer development of executive
functions (De Bellis et al., 2005) and memory (Brown & Tapert, 2004). Emerging longitudinal evidence also suggests that earlier alcohol consumption increases the risk of depression in adolescence (Edwards et al., 2014a; Fleming et al., 2008; Marmorstein, 2009; Owens et al., 2008; Rodriguez, 2005; Skogen et al., 2016). The current thesis examines more deeply the relationship between alcohol consumption as a predictor of depressive symptoms in adolescence.

A Developmental Perspective on Risk and Protective Factors

Linked to Bronfenbrenner’s (1979) theory is the notion of risk and protective factors. Within epidemiology (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001) and public health (Baum, 2016), risk factors are defined as precursors to a disease or behaviour and are associated with a statistically significant increased probability of an outcome occurring. Risk factors can occur within multiple contexts, including the individual, family, school and community. Risk factors are associated with an increased likelihood of an outcome. For example, it is well known that cigarette smoking increases the risk of cardiovascular disease (Huxley & Woodward, 2011; Lloyd-Jones et al., 2009). However, because of a variety of other factors that interplay and impact on a smoker, such as genes, environment, frequency and amount of nicotine consumed, not everyone who smokes will develop cardiovascular disease. However, smoking is associated with an increased probability of developing this disease.

In contrast, protective factors are defined as any factor, characteristic or event that mitigates the negative influences of risk factors and thus reduces the likelihood that an individual will develop a specified disease or behaviour in the presence of risk factors (Arthur, Hawkins, Pollard, Catalano, & Baglioni Jr, 2002). In statistical terms, protective factors reduce the statistical power of risk factors by acting as either a direct, mediating or moderating variable in the association between risk factors and a specified outcome (Arthur...
et al., 2002). For example, a healthy diet and exercise are protective factors for cardiovascular disease, which reduce the likelihood of developing this disease.

Protective factors are grounded in Social Developmental theory (Catalano & Hawkins, 1996). The core principle underpinning this theory is that social interactions play a crucial role in child and adolescent development. For example, a child’s and adolescent’s experiences with their family, peers and interactions within the community will shape their development. Children and adolescents who are provided with the opportunity to positively engage with family, peers and the community, and are rewarded for pro-social behaviour are more likely to achieve healthy development. Thus, promoting protective factors is important for healthy child and adolescent development.

While risk and protective factors are defined as distinctly separate constructs, the same factor may be identified as either a risk or protective factor, subject to how it is scored (Masten et al., 2001). For example, a measure assessing peer connectedness may be considered peer closeness or peer isolation depending on the direction it is scored. Risk and protective factors are commonly discussed in the literature as a way of organising these factors into different domains (Farrington, 2000; Hawkins et al., 1992). Within each domain, risk and protective factors can be further categorised into genetic, biological, psychological, social and environmental factors (Weissberg, Kumpfer, & Seligman, 2003). In the current thesis, risk and protective factors are organised into individual, family, peer, school and community domains.

As highlighted in the smoking example above, it is important to understand that while risk factors increase the likelihood of a specified outcome this does not mean that the presence of one or more risk factors will lead to this outcome in all cases. Similarly, the presence of protective factors does not guarantee that individuals will not develop a specified
disease or problem behaviour. For example, while low academic achievement is a risk factor for early school dropout, many students who experience low academic achievement do not leave school early. However, for adolescents who are exposed to multiple risk factors such as high-risk peer group, early aggression, family disruption and having a sibling who has dropped out, low academic achievement may be associated with a greater risk of dropping out of school (Hammond, Linton, Smink, & Drew, 2007). Findings from adolescent samples indicate that as the number of risk factors increases, an individual's risk of a specified outcome increases. This has been found for depressive symptoms (Bond et al., 2005) and violence (Herrenkohl et al., 2000).

Risk and protective factors can also affect individuals at different stages of their lives. At each developmental stage across the lifespan, different risks occur that can affect developmental outcomes. It is important to identify modifiable risk and protective factors that affect developmental outcomes and ascertain at which ages these risk factors pose the greatest risk. Identifying modifiable risk and protective factors guides the development of preventative and health promotion interventions that can alter developmental processes and lead to healthier outcomes (NRCIM, 2009; Willms, 2002). Modifiable risk and protective factors are those that can be changed, such as diet, exercise, alcohol consumption and parenting (Cairns, Yap, Pilkington, & Jorm, 2014). Non-modifiable factors are those that cannot be changed, and include, for example, biological sex, age and genetics (Cairns et al., 2014). Prevention and health promotion efforts often target risk factors with the aim of reducing or eliminating these factors to promote healthy development (Baum, 2016). To develop successful and well-timed interventions, it is essential to understand how health and behaviour outcomes are shaped by risk and protective factors during different developmental stages, and to examine the age-related changes across the lifespan.
A Developmental Perspective on the Co-occurrence of Alcohol Consumption and Depression

The co-occurrence between alcohol consumption and depression may also be developmentally linked. As discussed in Chapter 1, adolescence is a vulnerable period for the development of both depression and alcohol initiation. Depression tends to emerge in adolescence and its prevalence increases throughout this period (Kessler et al., 2001; Kim-Cohen et al., 2003). By late adolescence, the prevalence of depression reaches similar rates seen in adulthood (Kessler et al., 2001; Lawrence et al., 2015). Likewise, the majority of individuals first consume alcohol in their adolescence and the rates of consumption increase steadily throughout adolescence (AIHW 2014; Steketee et al., 2013; Toumbourou et al., 2009).

Depression and early alcohol consumption are also associated with an increased risk of similar problems in adulthood. Adolescent onset depression is one of the strongest predictors of depression in adulthood (homotypic prediction) (Aalto-Setala et al., 2014; Goodwin et al., 2004; Kim-Cohen et al., 2003; Lewinsohn et al., 1999; Pine et al., 1999). Adolescent onset depression is also associated with a more severe course and recurrent episodes compared to depression with an onset in adulthood (Aalto-Setala et al., 2014; Hammen, Brennan, & Keenan-Miller, 2008; Pine et al., 1999). While clinical alcohol problems (i.e. Alcohol Use Disorder) are uncommon in adolescence (Kessler et al., 2007), early alcohol consumption prior to age 15 significantly increases the risk of AUD in adulthood (DeWit et al., 2000; Grant & Dawson, 1997).

Similarly, epidemiological evidence suggests that the co-occurrence between depression and alcohol consumption has its origins in adolescence. Large representative cross-sectional studies indicate that alcohol consumption and depression in adolescence are positively associated; thus, as one increases the other also tends to increase (Arbour-
Preliminary longitudinal evidence supports the reverse hypothesis, suggesting that early alcohol consumption increases the risk of depressive symptoms in adolescence (Edwards et al., 2014a; Marmorstein, 2009; Skogen et al., 2016). This evidence suggests that the co-occurrence between alcohol consumption and depression begins in adolescence, and could be underpinned by developmental changes. Understanding age-related differences is important to understanding the development of the association between alcohol consumption and depression.

On a biological level, alcohol affects adolescents and adults differently. Findings from animal studies show that adolescents are less sensitive to alcohol-induced sedation (Little, Kuhn, Wilson, & Swartzwelder, 1996; White & Swartzwelder, 2005) and motor impairment (White & Swartzwelder, 2005) effects of alcohol intoxication than adults. However, animal studies suggest that adolescents are more sensitive to the effects of alcohol on memory and learning than adults (Hiller-Strumhofel & Swartzwelder, 2005; Markwiese, Acheson, Levin, Wilson, & Swartzwelder, 1998). Findings from another study also showed that adolescent mice were more sensitive than adult mice to the effects of alcohol on gamma-aminobutyric acid (GABA) neurotransmitters (Wills, Kash, & Winder, 2013), a neurotransmitter that is involved in depression. The effects of alcohol consumption on the developing brain may contribute to the development of depression in adolescence following alcohol initiation.

The co-occurrence between alcohol consumption and depression may have its origins in childhood and adolescence, due in part to their adverse effects on the attainment of developmental tasks. Both alcohol consumption and depression in adolescence are associated with poorer academic (Chatterji & DeSimone, 2005; Ellickson et al., 2003; McLeod et al., 2012; Needham et al., 2004) and social outcomes (Newburn & Shiner, 2001; Shepherd et al., 2012).
2006). Failure to develop positive social relationships and academic failure may increase the risk of both depression and alcohol consumption. Within the family domain, longitudinal evidence suggests family conflict increases the risk of both depression and alcohol consumption (Chan, Kelly, & Toumbourou, 2013). Increasing conflict and family stress may increase one’s vulnerability to depression and alcohol initiation (Angold et al., 1998; {Lewis et al., 2012; Sawyer et al., 2002).

Developmental changes are also not limited to linear patterns. Studies with adults suggest the co-occurrence between depression and alcohol consumption is non-linear, following a J-shaped or U-shaped pattern (Alati et al., 2005; Caldwell et al., 2002; Coelho et al., 2014; Rodgers et al., 2000; Skogen, Harvey, Henderson, Stordal, & Mylketun, 2009). Following a J-shape, non-drinkers and heavy drinkers were found to be at greater risk of depressive symptoms compared to moderate drinkers (no more than 1 to 2 standard drinks per day). If a non-linear association exists in adolescence, it may be related to different timings in developmental changes (Steinberg, 2010).

The dual systems model suggests that the difference in developmental timings between an early maturing social-emotional system (dopaminergic) and a slower maturing self-regulatory system (pre-frontal cortex) contributes to increases in risk-taking behaviour during adolescence, including alcohol use (Steinberg, 2010). Until age 25, the pre-frontal cortex continues to develop. This is an area of the brain that controls an individual’s capacity for self-regulation; hence, an adolescent’s capacity for self-control has not reached adult-like capacity (Steinberg, 2010; Spear, 2000). Conversely, in early adolescence, there is an increase in novelty seeking due to development of the dopaminergic system within the brain (Harden & Tucker-Drob, 2011; Steinberg, 2010). The temporal gap between the development of novelty seeking and the self-regulation capacity in adolescence seem to suggest that the association between depression and alcohol use may not always be linear.
Some theories also suggest that self-regulation capacities exist on a continuum, from low self-control to high self-control (Block & Block, 1980; Block & Kremen, 1996; Steinberg, 2010). It has been suggested that adolescents who are low in novelty seeking and high in self-control are at greater risk for depression. Whereas, individuals who are high in novelty seeking and low in self-regulation are more likely to engage in alcohol use. There has been some empirical support for this theory (Ernst et al., 2006; Murray & Kochanska, 2002; Willoughby & Fortner, 2015). For example, a four-year longitudinal study (N = 103) identified that children low in self-control displayed significantly more externalising problems and children high in self-control exhibited more internalising problems (Murray & Kochanska, 2002). Likewise, a large Canadian longitudinal (N = 4,412) study found that adolescents who reported co-occurring depressive symptoms and alcohol use were low in self-control, whereas adolescents who displayed depressive symptoms only were low in novelty seeking (Willoughby & Fortner, 2015). The evidence seems to suggest that when depression and alcohol use co-occur, the association between these problems may follow a non-linear pattern.

Conclusion

In summary, a developmental framework is useful for understanding the development of health-related problems across the lifespan. The evidence cited in this chapter supports the notion that the co-occurrence between alcohol consumption and depression may be underpinned by developmental changes. There is evidence for age-related patterns in the development of depression and alcohol consumption. The co-occurrence of these problems elevates the risk for attempted and completed suicide and other poor outcomes, such as poor academic performance. There are also shared underlying risk factors that increase the likelihood of both outcomes.
Despite efforts to prevent adolescent depression and alcohol consumption, both remain wide-spread problems, internationally and in Australia. Developing a stronger understanding of co-occurrence between alcohol consumption and depression is important for developing effective prevention and early interventions. For example, if alcohol consumption increases the risk of developing depression, interventions that help to reduce or delay alcohol consumption will help reduce the incidence of depression in adolescence. This may not only improve adolescent mental health outcomes, but also improve outcomes in adulthood, as the most severe forms of depression tend to have their onset in adolescence. Therefore, prevention efforts that delay the onset of both alcohol consumption and depression may lead to lifelong mental health benefits.
Chapter 3: Risk and Protective Factors for Adolescent Depression

Chapter Overview

This chapter provides an overview of public health approaches to prevention. It then presents the evidence in support of a public health approach for the prevention of adolescent depression. Using Bronfenbrenner’s theory to organise the literature, this chapter examines the evidence regarding the risk and protective factors for adolescent depression. This evidence will be used to guide the selection of covariates included in the two empirical studies that may confound the association between alcohol consumption as a risk factor for depression.

Public Health Approach to Prevention

The practice of public health is multidisciplinary; it draws on knowledge and expertise from multiple disciplines such as medicine, epidemiology, criminology, psychology and education (Baum, 2016). The public health approach to prevention is grounded in ecological theories and underpinned by notions of risk and protective factors. As discussed in Chapter 2, risk factors increase the probability of an outcome occurring, while protective factors reduce the probability. Risk and protective factors are not causal factors, rather they are factors associated with an increased or decreased likelihood that an individual will develop a specific outcome.

Bronfenbrenner’s theory plays a major role in a public health prevention approach. As mentioned earlier, the theory suggests there is no single cause of health and social behaviours (Baum, 2016). Instead, the development of disease and problem behaviours are viewed as the result of complex interactions between individual, family, school, community and cultural factors. The focus of the public health prevention approach is on developing effective population-level interventions and strategies that target large groups and reduce the
prevalence of a specified outcome. This approach comprises four steps (Mercy, Rosenberg, Powell, Broome, & Roper, 1993):

1. To define the problem through epidemiological research that identifies the scope, prevalence, consequences and costs of the outcome.
2. To identify risk and protective factors for the outcome, including modifiable factors that could be targeted through intervention.
3. To design and evaluate interventions, with a focus on population-level interventions that target large groups of individuals.
4. To ensure widespread adoption of effective interventions.

The public health approach has a long history in the medical field and has been successfully applied to reduce the spread and incidence of disease. For example, the eradication of tuberculosis was declared in Australia in 1997, more than 20 years after the implementation of a public health program designed to eliminate the virus from all cattle and reduce the spread of the disease (Cousins & Roberts, 2001). Over the past decade, prevention efforts in Africa have achieved a reduction in new HIV cases by 38% and the incidence of new infections in children has dropped by 58% (WHO, 2014b). Prevention programs to reduce the spread of HIV include programs that promote the use and accessibility of condoms, and prevention programs that educate and support at-risk groups such as drug users, sex workers or gay men. While communicable diseases are on the decline due to prevention efforts, non-communicable diseases, such as substance use and mental health problems, continue to rise and are a national and international health priority (Catalano et al., 2012).

The public health approach has been adapted to the field of social and behavioural sciences, although it has predominantly been applied to externalising problems such as
violence, substance use and delinquency (Catalano & Hawkins, 1996; Hawkins et al., 1992; Hawkins et al., 2000; Shader, 2002). There is a large body of research that has examined and identified risk and protective factors of adolescent externalising problems (Farrington, 2000; Farrington & Welsh, 2007; Hawkins et al., 2000; Herrenkohl et al., 2000; Murray & Farrington, 2010). Subsequently, a number of evidence based programs have been developed that effectively reduce adolescent externalising behaviours, such as the Strengthening Families Program (10-14) (Spoth, Trudeau, Guyll, Chungyeol, & Redmond, 2009), Triple P Positive Parenting Program (Bodenmann, Cina, Ledermann, & Sanders, 2008), Families and Schools Together (FAST) (Fischer, 2003), Behaviour Exchange Systems Training PLUS and the Friendly Schools and Families program (Cross et al., 2011).

**Public health approach to depression.** In preventing mental health problems across the lifespan, childhood and adolescence represent a distinct period of vulnerability. Epidemiological evidence indicates that approximately 50% of all lifetime mental disorders emerge prior to age 14 and 75% by age 24 (Kessler et al., 2005). Longitudinal evidence demonstrates that mental health problems during adolescence are one of the strongest predictors of mental health problems in adulthood (Copeland et al., 2009; Goodwin et al., 2004). As indicated earlier, depression often first emerges in adolescence and is associated with a more severe course, greater levels of impairment and more recurrent episodes than depression that has its onset in adulthood (Hammen et al., 2008). Multiple longitudinal studies have demonstrated that depression remains relatively stable across the lifespan; thus, depression that emerges in adolescence tends to persist into adulthood (Lewinsohn et al., 1999; Lewinsohn, Rohde, Seeley, Klein, & Gotlib, 2000; Wight, Sepulveda, & Aneshensel, 2004). A qualitative review of the evidence suggests adolescent depression is similar to adult depression in terms of clinical presentation, correlates and course (Rao & Chen, 2009).
Despite the high prevalence of mental health problems in adolescence, there are low rates of help-seeking behaviour and unfortunately high rates of untreated mental health problems in Australia (Sawyer et al., 2000), the USA (Costello et al., 2003; Kataoka, Zhang, & Wells, 2002) and New Zealand (Fergusson & Horwood, 2001). However, should there be an increase in help-seeking behaviour among adolescents, it is unlikely the health system would be able to meet the growing demand for mental health services (Collins, Westra, Dozois, & Burns, 2004). Therefore, public health prevention and early intervention programs are needed to address the growing number of adolescents suffering from psychological disorders.

Despite the barriers adolescents face in accessing treatments and the significant health burden depression contributes, the primary focus has been on treatment rather than prevention (McLaughlin, 2011). There has been a recent push for multi-level preventative interventions to reduce the population health burden of depression (Patel et al., 2007; WHO, 2012). While only in the early stages, there has been promising research that seeks to identify risk factors that could be targeted in preventative efforts. For example, a key study within this area is the Christchurch Health and Development Study, a New Zealand longitudinal study that tracked the development of 1265 children born in 1977 until age 21 (Fergusson & Horwood, 2001). The longitudinal design of this study, combined with its high retention rate, has enabled researchers to understand temporal associations between risk factors and outcomes, with a strong focus on mental health outcomes. This study identified that parental conflict, child abuse, economic disadvantage and family dysfunction prior to age 14 increase the risk of mental health problems in late adolescence (Fergusson & Horwood, 2001).

In summary, depression tends to emerge early in life and appears to be linked with early developmental changes (Kessler et al., 2005). Depression that emerges in adolescence tends to persist across the lifespan (Wight et al., 2004) and follows a more severe and chronic
course than depression that emerges in adulthood (Hammen et al., 2008). Depression that emerges later in life may be underpinned by life stressors, compared to depression that emerges in adolescence, which may be underpinned by early developmental changes. As discussed in Chapter 2, developmental trajectories may not always be linear (Willett, Singer, & Martin, 1998). Taken together, this evidence suggests that adolescence is a critical period for the prevention of depression across the lifespan.

The developmental processes that underlie the onset of depression must be addressed early in life to reduce the prevalence and impact of depression across the lifespan. With this in mind, the current thesis takes a preventative public health approach to the study of adolescent depression. This thesis aims to contribute to steps one (i.e. defining the scope of the problem) and two (i.e. identifying modifiable risk factors that could be targeted through intervention). This thesis will contribute to step one by examining the prevalence of co-occurring alcohol consumption and depression in Australian adolescents. The primary focus of this thesis will be on step two of the public health approach, which aims to more deeply examine alcohol consumption as a predictor of depressive symptoms in adolescents, while controlling for well-known other risk factors. The next section summarises the evidence for these other risk factors.

**Risk Factors of Depression in Adolescence**

A review of the literature was conducted to identify risk factors associated with adolescent depression. The purpose of this review was to examine the evidence and identify risk and protective factors that should be controlled for in the two empirical studies for this thesis. A systematic search of the literature was conducted. Search terms used were a combination of adolescent, youth, teenager, depression, depressive disorder, depressive symptoms, psychological distress, mental disorder, mental health, risk, risk factor, protective factor, meta-analysis, systematic review, in conjunction with the name of each specific
factors, which are presented below. Electronic databases Academic Search Complete, CINAHL complete, ERIC, Global Health, MEDLINE Complete, PsychARTICLES and PsychINFO databases were searched. Articles from 1980 to December 2015 were included. Studies summarised are representative of international and Australian studies. According to Bronfenbrenner’s theory, studies are organised into the domains of individual, family, school and community.

Using the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines, systematic reviews and meta-analyses were identified first. If these types of studies could not be identified, searches for specific longitudinal studies and then cross-sectional studies were undertaken. Longitudinal evidence is considered higher quality evidence than cross-sectional data, as it allows for the examination of temporal associations between potential risk factors and outcomes (NHMRC, 2009b). Thus, longitudinal studies are needed to identify whether a variable is a risk factor for adolescent depression.

**Individual-level factors.** There are a number of meta-analysis and longitudinal studies that have examined individual-level factors that are associated with increased rates of depressive symptoms in adolescence. Table 4 summarises the evidence for seven individual-level factors: genetics, female sex, age, pubertal stage, cigarette use, marijuana use and perceived weight.
Table 4

**Summary of Studies Examining Individual-level Factors Associated with Depression in Adolescents**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths and limitations</th>
</tr>
</thead>
</table>
| Genes    | MDD     | Meta-analysis (Pooled N = 2228) | The evidence shows a familial link for MDD in adolescents; however, it is unclear whether this is due to genetics or family environment. Results vary widely across study designs. Twin studies show a strong genetic link while adoption studies suggest there is little evidence of a genetic contribution to adolescent depression (Rice, Harold, & Thapar, 2002). | **Strength:** Included a range of studies that used a strict inclusion criteria: familial, twin and adoption studies.  
**Limitations:** Majority of the studies used US samples; thus, the results may not be generalisable to other populations. Studies vary widely in the measurement of MDD. |
| Genes    | MDD     | Longitudinal | In a USA sample of females (N = 3416) evidence suggested that genetic contribution of MDD in female adolescents was estimated to be 40%, with environmental contribution of 60% (Glowinski, Madden, Bucholz, Lynskey, & Heath, 2003). | **Strengths:** Prospective longitudinal design. Large sample size of female twins, which allows comparison of genetic and environmental influences.  
**Limitations:** Did not include males and did not include subclinical levels of depressive symptoms, which is common in adolescence. |
| Genes    | D       | Narrative review | Review of child and adolescent familial, twin and adoption studies suggest the risk of depression during adolescence involves both genetic and environmental influences; however, environmental factors appear to be a more powerful influence (Rice, 2010). | **Strengths:** Presents a comprehensive discussion of the evidence base. Attempts to address the gene-environment interaction.  
**Limitations:** Narrative review, did not use systematic review protocol to evaluate the evidence. Does not clearly outline the sample characteristics of studies discussed. |
| Female sex | DS     | Meta-analysis (Pooled N = 61,424) | A meta-analysis of studies from the USA and Canada, identified that from age 13, female adolescents reported higher levels of depressive symptoms than males (Twenge & Nolen-Hoeksema, 2002). | **Strengths:** Comprehensive meta-analysis deriving a large sample size.  
**Limitations:** Sample comprised US and Canadian adolescents; as such, results may not be generalisable to other populations. |
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<tr>
<th>Variable</th>
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</table>
| Female sex | D       | Longitudinal | Several longitudinal studies have demonstrated that the gender difference emerges by age 14, at which time females report depressive episodes or symptoms at more than twice the rate of males (Galambos, Leadbeater, & Barker, 2004; Ge, Conger, & Elder, 2001; Wade et al., 2002). | **Strengths:** Longitudinal design. Use of valid measures to assess for adolescent depression.  
**Limitations:** Studies restricted to developed countries (USA, Canada, UK and Australia), thus, findings may not generalisable to other populations. |
| Female sex | D       | Cross-sectional | A national Australian epidemiological study ($N = 42,133$) demonstrated that females (12-17 years) were more than twice as likely to report MDD (11%) compared to males (5%) (Lawrence et al., 2015). | **Strengths:** National data and large sample size.  
**Limitations:** Cross-sectional design. |
| Age       | DS      | Meta-analysis ($N = 310$ samples) | Males reported stable rates of depression from ages 8 to 16. In contrast, females reported stable rates of depression from ages 8 to 11, and then depression increased steadily between ages 12 and 16 (Twenge & Nolen-Hoeksema, 2002). | **Strengths:** Resulting sample sized included 61, 424 children with roughly equal distribution of male and female participants from a range of methodological designs.  
**Limitations:** Studies limited to USA and Canada. Excluded studies that used a clinical sample and only included studies that used the Child Depression Inventory (CDI) to assess depressive symptoms. |
| Age       | D       | Longitudinal | The New Zealand Christchurch Health and Development longitudinal study ($N = 1265$) identified prevalence of depressive disorders increased steadily throughout adolescence; however, the rate increased more rapidly for females (Fergusson & Horwood, 2001). | **Strengths:** Longitudinal design that followed a birth cohort for 21 years with high retention rates.  
**Limitations:** Depressive disorders and bipolar disorder examined together. |
| Age       | DS      | Cross-sectional | In a national Canadian study ($N = 12,771$) of for males, depression did not increase with age. For females, depression increased until age 15 or 16, when rates of depression peaked (Poulin et al., 2004). | **Strengths:** National data and large sample size.  
**Limitations:** Cross-sectional design. |
<table>
<thead>
<tr>
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<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths and limitations</th>
</tr>
</thead>
</table>
| Age      | MDD     | Cross-sectional | A national Australian epidemiological study (n = 42,133) showed that depression increased significantly from childhood (ages 4-11) to adolescence (ages 12-17) (Lawrence et al., 2015). | **Strengths:** National data and large sample size.  
**Limitations:** Cross-sectional design. |
| Early onset puberty | D | Meta-analysis (Pooled N = 8055) | Early onset puberty was associated with an increased risk of depression in females. However, pubertal timing was not associated with an increased risk of depression onset (Galvao et al., 2014). | **Strengths:** Meta-analysis. Followed PRISMA protocol  
**Limitations:** Did not include males. Small number of studies. |
| Pubertal stage | DS | Longitudinal | In the National Longitudinal Adolescent Health Study (N = 17,792), males were most likely to experience depressive symptoms during the transition to puberty, which was mediated by the perception of oneself as not as physically large and developed as their male peers. However, post-pubertal females were more likely to experience depressive symptoms than pre-pubertal females. This association was mediated by perception of oneself as overweight and more developed than their peers (Vogt Yuan, 2007). | **Strengths:** Longitudinal design using a large representative national sample.  
**Limitations:** Pubertal stage was measured as a dichotomous variable, signified by only the onset of menarche for females and voice changes for males. Thus, this study does not examine this association across the full pubertal period. |
| Pubertal stage | DS | Longitudinal | Cross-national study of female adolescents from the USA (N = 2,885) and Australia (N = 2,884), identified that advancing pubertal stage was associated with an increased risk of depressive symptoms (Patton et al., 2008). | **Strengths:** Data collected in both the USA and Australia. Pubertal stage was measured as a continuous variable.  
**Limitations:** Did not include males. |
| Early onset puberty | DS | Longitudinal | In the Iowa Youth and Families Project (N = 451), females who experienced their menarche prior to 12.15 years old (early maturing group) experienced significantly higher depressive symptoms than their peers. Early onset puberty did not increase the risk of depressive symptoms in males (Ge et al., 2001). | **Strengths:** Longitudinal design.  
**Limitations:** Relatively small sample size for the statistical analysis procedure used and the number of interactions considered in this study. |
<table>
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<tr>
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<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths</th>
<th>Limitations</th>
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</thead>
<tbody>
<tr>
<td>Early menarche</td>
<td>MDD</td>
<td>Longitudinal</td>
<td>In a USA study ($N = 496$), early menarche (prior to 11.6 years) was associated with higher rates of MDD in females (Stice, Presnell, &amp; Bearman, 2001).</td>
<td><strong>Strengths:</strong> Longitudinal design. Focused on clinical levels of depression.</td>
<td><strong>Limitations:</strong> Only one-year follow up period, with two data points. This limits conclusions that can be drawn about changes in the association over time.</td>
</tr>
<tr>
<td>Cigarette use</td>
<td>D</td>
<td>Longitudinal</td>
<td>Adolescents ($N = 1,322$) who smoked cigarettes were 1.4 times more likely to report a MDE 2 and 4 years later (Galambos et al., 2004).</td>
<td><strong>Strengths:</strong> Longitudinal design with a large adolescent sample.</td>
<td><strong>Limitations:</strong> Participants were a subset of participants from a larger national study; this subset was not randomly selected.</td>
</tr>
<tr>
<td>Cigarette use</td>
<td>DS</td>
<td>Meta-analysis ($N = 17$ studies)</td>
<td>Meta-analysis of longitudinal studies indicated a small but significant effect; cigarette smoking is associated with higher levels of depressive symptoms in adolescents (Cairns et al., 2014).</td>
<td><strong>Strengths:</strong> Followed the PRISMA protocol and included only studies using prospective cohort designs with predominantly population-based samples.</td>
<td><strong>Limitations:</strong> Only 17 of the 34 studies that met inclusion criteria could be included in the meta-analysis due to the nature in which the data was reported in the original papers.</td>
</tr>
<tr>
<td>Cigarette use</td>
<td>DS</td>
<td>Systematic review ($N = 6$ studies)</td>
<td>Systematic review of longitudinal studies showed that smoking cigarettes increased the risk (OR = 1.73) of depressive symptoms in adolescence (Chiaton, Cohen, O’Loughlin, &amp; Rehm, 2009).</td>
<td><strong>Strengths:</strong> The use of a systematic literature review approach to evaluate the evidence. Used strict inclusion criteria to obtain a representative non-clinical sample of adolescents.</td>
<td><strong>Limitations:</strong> The variables included to control for confounding effects varied across studies, which may inflate the pooled estimate in this study.</td>
</tr>
<tr>
<td>Variable</td>
<td>Outcome</td>
<td>Study design</td>
<td>Summary of findings</td>
<td>Strengths and limitations</td>
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<tr>
<td>Marijuana use</td>
<td>DS</td>
<td>Meta-analysis ($N = 6$ studies)</td>
<td>Meta-analysis of six longitudinal studies showed that marijuana use was associated with higher levels of depressive symptoms (Cairns et al., 2014).</td>
<td><strong>Strengths:</strong> Followed the PRISMA protocol and included only longitudinal studies. <strong>Limitations:</strong> Some studies could not be included in the meta-analysis, due to the way the data was reported in the original publication.</td>
<td></td>
</tr>
<tr>
<td>Perceived weight</td>
<td>DS</td>
<td>Longitudinal</td>
<td>In an Australian sub-sample of adolescents ($n = 1144$), participants who perceived themselves as overweight at age 14 experienced higher rates of depression at age 21 (Al Mamun et al., 2007).</td>
<td><strong>Strengths:</strong> Longitudinal design. <strong>Limitations:</strong> Did not examine whether perception of weight in early adolescence was a predictor of depressive symptoms in later adolescence.</td>
<td></td>
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<tr>
<td>Perceived weight</td>
<td>DS</td>
<td>Cross-sectional</td>
<td>In a USA sample ($N = 3,892$) of adolescents found a significant association between BMI and depression. In addition, perception of self as overweight was associated with an increase in depressive symptoms (Bazargan-Hejazi, Alvarez, Teklehaimanot, Nikakhtar, &amp; Bazargan, 2010).</td>
<td><strong>Strengths:</strong> Examined the effects of both BMI and self-perception of weight on depressive symptoms in a large sample of adolescents. <strong>Limitations:</strong> Cross-sectional design.</td>
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<tr>
<td>Perceived weight/</td>
<td>IS</td>
<td>Cross-sectional</td>
<td>In a Dutch sample of adolescents ($N = 7756$), the perception of one’s weight as “too heavy” was a stronger predictor of internalising symptoms than BMI (ter Bogt et al., 2006).</td>
<td><strong>Strengths:</strong> Large sample. Compared body weight perception and BMI. <strong>Limitations:</strong> Cross-sectional design.</td>
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<tr>
<td>BMI</td>
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<tr>
<td>Perceived weight/</td>
<td>DS</td>
<td>Cross-sectional</td>
<td>In a Chinese sample of adolescents ($N = 1144$), participants who perceived themselves as overweight were more likely to experience depressive symptoms than participants who perceived themselves as normal or underweight. Actual weight did not predict depressive symptoms (Tang et al., 2010).</td>
<td><strong>Strengths:</strong> Compared body weight perception and actual weight. <strong>Limitations:</strong> Cross-sectional design.</td>
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<tr>
<td>Variable</td>
<td>Outcome</td>
<td>Study design</td>
<td>Summary of findings</td>
<td>Strengths:</td>
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<tr>
<td>Perceived weight</td>
<td>MDD</td>
<td>Cross-sectional</td>
<td>In a USA adolescent sample ($N = 4175$), perceived weight significantly increased the risk of MDD (OR = 4.35) (Roberts &amp; Duong, 2013).</td>
<td>Examined actual weight and perceived weight on MDD.</td>
<td>Cross-sectional design.</td>
</tr>
</tbody>
</table>

*Note. D = Depression (multiple forms analysed); DS = Depressive symptoms; IS = Internalising symptoms; MDD: Major depressive disorder.*
**Genes.** The evidence in this section was obtained from a combination of meta-analyses and longitudinal familial, twin and adoption studies that have examined the hereditability of depression in adolescence. Meta-analytical evidence suggests that adolescents of depressed parents are at three to four times greater risk of developing MDD compared to adolescents of non-depressed parents (Rice et al., 2002). However, familial studies cannot identify whether this increased risk is due to genetic transmission or environmental influences. Longitudinal twin studies estimate that genetics account for approximately 40% of the transmission of depression in adolescents (Glowinski et al., 2003). Evidence from longitudinal adoption studies, however, suggest environmental factors play a stronger role in the transmission of depression from parent to adolescent (Tully, Iacono, & McGue, 2008). For example, this research question was examined in a longitudinal study that compared adopted adolescents (n = 568) whose adoptive parent had experienced depression with adolescents whose adoptive parent had not experienced depression, while also including a control sample of non-adopted adolescents (n = 416) (Tully et al., 2008). Results identified that adolescents whose un-related adoptive parent had suffered depression reported depression themselves at increased rates compared to adolescents whose adoptive parent had no history of depression (OR = 2.19). The current evidence base suggests that genetics may be associated with an increased risk of depression; however, the transmission of depression from parent to child may be more strongly linked with environmental family-level factors than genetics. Family-level factors will be examined later in this chapter.

**Biological sex.** A large meta-analysis (N = 61,242) confirmed that female adolescents are at significantly greater risk of depression than males (Twenge & Nolen-Hoeksema, 2002). Longitudinal studies have identified that the sex differences in depressive symptoms emerge during early puberty between the ages of 12 and 14 and this gap continues to widen into late adolescence (Ge et al., 2001; Wade et al., 2002). A large multi-country longitudinal study
conducted across Canada \((n = 1,443)\), United Kingdom \((n = 753)\) and the United States \((n = 4,834)\) identified that, at age 16, females were eight times \((OR = 7.98)\) more likely to report clinically significant depressive symptoms compared to males of the same age (Wade et al., 2002). Australian cross-sectional epidemiology data indicates that female adolescents experience MDD and depressive symptoms at more than twice the rate of males (Boyd et al., 2000; Lawrence et al., 2015). Similarly, US cross-sectional epidemiology data demonstrates that female adolescents are three times more likely to experience MDD compared to males (SAMHSA, 2014). The current evidence base consistently demonstrates that female sex is a risk factor for developing depression in adolescence.

**Age.** Depression in childhood is rare, with estimates ranging from 0.4% to 2.8% (Costello et al., 2003; Costello, Eranli, & Angold, 2006; Lawrence et al., 2015). In early adolescence, an increase in the prevalence of depression has been observed (Costello et al., 2003; Lawrence et al., 2015). Longitudinal evidence suggests that depression increases throughout adolescence for both genders, although there is a steeper increase for females (Costello et al., 2003; Fergusson & Horwood, 2001). This finding was confirmed in a large meta-analysis (pooled \(N = 61,424\)) that found between the ages of eight and 16, the rates of depression remained relatively stable for males and increased steadily from age 12 for females \((d = 0.18)\) (Twenge & Nolen-Hoeksema, 2002). Australian cross-sectional evidence demonstrates the prevalence of depression increases significantly from early to late adolescence for both sexes (Lawrence et al., 2015). While Canadian cross-sectional evidence demonstrates that after an initial increase in early adolescence, the prevalence of depression in males remains relatively stable into late adolescence (Poulin et al., 2004). Overall, as there is a large meta-analysis and two strongly designed longitudinal studies, the evidence indicates that increasing age in adolescence is a stronger risk factor for depression in females than males.
**Puberty.** Puberty is a period of biological and sexual maturation that occurs during adolescence (Patton & Viner, 2007). The majority of research examining whether puberty is associated with depression has focused on investigating this in female samples (Galvao et al., 2014; Stice et al., 2001; Patton et al., 2008). A meta-analysis of longitudinal case control and cohort studies identified that early onset puberty increased the risk of depression in females (Galvao et al., 2014). Longitudinal evidence also demonstrates that early menarche (Ge et al., 2001; Stice et al., 2001) increases the risk of depression among female adolescents.

Longitudinal studies have also found the risk of both onset and persistence of depression increases significantly with advancing pubertal stage (Patton et al., 2008; Vogt Yuan, 2007). Longitudinal evidence suggests the association between post-pubertal stage and depression in females may be mediated by an individual’s perception of herself as overweight and more physically developed than their peers (Vogt Yuan, 2007). Based on the meta-analytic and longitudinal evidence, the findings consistently suggest that early-onset puberty is associated with an increased risk of depression in female adolescents.

Fewer studies have examined whether puberty is linked with depression in males. Two longitudinal studies suggest that early onset puberty does not increase the risk of depressive symptoms in males (Ge et al., 2001; Vogt Yuan, 2007). However, evidence from a large longitudinal study suggests males may be at a higher risk of depressive symptoms during the transition to puberty, and this association is mediated by the perception of oneself as being not as physically large and developed as their peers (Vogt Yuan, 2007). Based on this evidence, further research is needed to examine the association between puberty and depression in males.

**Cigarette use.** A recent meta-analysis of 36 longitudinal studies identified 23 associations between cigarette use and depressive symptoms (Cairns et al., 2014). Collectively, the results indicated that cigarette use is associated with an increased risk of
depression; however, the mean effect size was small but significant ($r = 0.09$). In addition, in an earlier meta-analysis of 15 longitudinal studies, cigarette smoking predicted depression (OR = 1.73) (Chiaton et al., 2009). Overall, as there were two meta-analyses, including a large number of longitudinal studies, the evidence supports cigarette smoking as a risk factor for depression in adolescence.

**Marijuana use.** A recent meta-analysis of six longitudinal studies identified marijuana use in adolescence predicted higher levels of depression (Cairns et al., 2014). The effect size was small but significant ($r = 0.12$). Overall, the current evidence suggests marijuana use is temporally associated with adolescent depression and provides support for considering marijuana as a risk factor for depression.

**Body weight perception.** Longitudinal evidence suggests that adolescents who perceived themselves as overweight at age 14 were at increased risk of depression in early adulthood (Al Mamun et al., 2007). Four cross-sectional studies identified a significant association between perceived weight and depression in adolescence (Bazargan-Hejazi et al., 2010; Tang et al., 2010; ter Bogt et al., 2006; Roberts & Duong, 2013). However, these studies do not provide evidence about the direction of the association. Based on this evidence, there is preliminary evidence that the perception of oneself as overweight may increase the risk for depression. However, further studies are needed, with a particular focus on the adolescent developmental period.

**Family-level factors.** There are a number of meta-analysis and longitudinal studies that have examined family-level factors associated with depressive symptoms in adolescence. Table 5 summarises evidence for four family-level risk factors: parental depression, family conflict, parent-child relationship and poor family management.
# Table 5

**Summary of Studies Examining Family-level Factors Associated with Depression in Adolescents**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths and limitations</th>
</tr>
</thead>
</table>
| Parental depression | IS      | Meta-analysis (N = 193 studies) | In a large meta-analysis of cross-sectional and longitudinal studies examining a range of childhood behaviour outcomes, maternal depression significantly increased the risk of IS in children and adolescents, although the effect size was small (Goodman et al., 2011).                                                                 | Strengths: Comprehensive meta-analysis.  
Limitations: The sample was overrepresented by children; with fewer adolescents in the sample it is difficult to ascertain the long-term effects of maternal depression on adolescents. Did not comprise a separate analysis for longitudinal studies, which means it is difficult to determine the temporal nature of the association. |
| Parental depression | IS      | Meta-analysis (n = 17 studies examining IP) | In a meta-analysis of cross-sectional and longitudinal studies paternal depression, father’s depression increased the risk of internalising symptoms and diagnoses in children and adolescents (Kane & Garber, 2004).                                                                 | Strengths: Meta-analytical design.  
Limitations: The meta-analysis did not conduct a separate analysis for longitudinal studies, which means it is difficult to determine the temporal nature of the association. |
| Parental depression | MDD     | Longitudinal          | In a US sample of adopted (n = 568) and non-adopted (n = 416) adolescents, the effects of parental MDD on the risk of MDD in adolescents was examined. Maternal and paternal MDD was associated with a significantly increased risk for MDD in both adopted and non-adopted adolescents. Results showed that adolescents whose biologically un-related parent had suffered MDD were at significant greater risk for MDD than adolescents whose adoptive parent had no history of MDD (OR = 2.19) (Tully et al., 2008). | Strengths: Examined the effects of parental depression on both adopted and non-adopted adolescents, which enables the impact of environmental and biological influences to be investigated.  
Limitations: Retrospective longitudinal design, which may bias recall of information and participant selection. |
| Parental depression | D       | Longitudinal          | In an Australian sample of 699 participants in late adolescence, the effects of maternal depression on adolescent depression were mediated by early-onset depression and interpersonal difficulties for females. For males, the association was mediated by early-onset depression (Hammen et al., 2008).                                                                 | Strengths: Longitudinal design that examined possible mediators of the association.  
Limitations: Arbitrary age of 15 used to define early-onset depression. |
<table>
<thead>
<tr>
<th>Variable</th>
<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths and limitations</th>
</tr>
</thead>
</table>
| Family conflict               | DS      | Meta-analysis (N = 6 studies) | In a meta-analysis of six longitudinal studies, exposure to higher levels of marital conflict was associated with an increased risk of depression, although the effect size was small (Yap, Pilkington, Ryan, & Jorm, 2014). | **Strengths:** Meta-analytical design and followed PRISMA protocol.  
**Limitations:** Sacrificed micro-detail for macro-level synthesis of literature. Lack of generalisability across cultures, majority of the studies used American samples. |
| Parent-child relationship     | DS      | Longitudinal          | Several longitudinal studies demonstrate that poorer parent-child relationship in adolescence is a predictor of higher levels of depressive symptoms (Branje, Hale, Frijns, & Meeus, 2010; Hair, Moore, Garrett, Ling, & Cleveland, 2008; Kouros & Garber, 2014). | **Strengths:** Longitudinal studies from the Netherlands and America.  
**Limitations:** The majority of studies used adolescent self-report measures to assess parent-child relationship quality. |
| Poor family management        | D       | Meta-analysis (N = 3 studies) | In a meta-analysis of parental factors associated with adolescent depression, both parental monitoring and discipline practices were examined. Both these variables are often considered under the broader category of poor family management. In this meta-analysis, a lack of parental monitoring (3 longitudinal studies) and inconsistent discipline (4 cross-sectional studies) practices predicted higher levels of depressive symptoms (Yap et al., 2014). | **Strengths:** Meta-analytical design and followed PRISMA protocol.  
**Limitations:** Evidence for inconsistent disciplining practices was based on only cross-sectional evidence. |
| Poor family management        | DS      | Longitudinal          | In a sample of African American adolescents (N = 302) from low-income families, lower parental monitoring predicted increases in depressive symptoms two years later (Sagrestano, Holmbeck, Paikoff, & Fendrich, 2003). | **Strengths:** Longitudinal design.  
**Limitations:** Inclusion of only young adolescents, where prevalence of depression is lower. Small minority sample (N = 302) of African American adolescents, limited generalisability to other populations. |
| Poor family management        | DS      | Cross-sectional       | A US study identified a strong association between poor family management (discipline and parental monitoring) and increased depressive symptoms in adolescents (Olson & Goddard, 2010). | **Strengths:** A large national sample of almost 40,000 adolescents.  
**Limitations:** Cross-sectional design, therefore unable to identify temporality. |

*Note.* D = Depression (multiple forms analysed); DS = Depressive symptoms; IS = Internalising symptoms; MDD: Major depressive disorder.
**Parental depression.** Meta-analytical evidence demonstrates that both maternal (Goodman et al., 2011) and paternal depression (Kane & Garber, 2004) was associated with an increased risk for depression in adolescence. However, neither meta-analysis conducted separate analyses with longitudinal evidence, which means it cannot be confirmed from these studies whether parental depression acts as a risk factor for adolescent depression. Evidence from two specific longitudinal studies suggests parental depression was temporally associated with an increased risk of depression in adolescence (Hammen et al., 2008; Tully et al., 2008). Longitudinal evidence indicates that both adopted and non-adopted adolescents were at increased risk for depression when either their non-biological or biological parent suffered depression. This study suggests that environmental factors may contribute to the transmission of depression from parent to adolescent. Other longitudinal evidence suggests the association between parental and adolescent depression may be mediated by early-onset depression in both males and females, as well as social difficulties in females (Hammen et al., 2008). Overall, evidence suggests that adolescents with a depressed parent are at increased risk of developing depression.

**Family conflict.** In a meta-analysis of six longitudinal studies, parental conflict was associated with an increased risk of depression in adolescents (Yap et al., 2014). The size of the effect was significant, but small ($r = 0.18$). Overall, the current evidence base suggests parental conflict increases the risk of depression in adolescence.

**Parent-child relationship quality.** Evidence from three longitudinal studies suggest that poorer parent-child relationship quality is associated with an increased risk of adolescent depression (Branje et al., 2010; Hair et al., 2008; Kouros & Garber, 2014). For example, poor family relationship quality as reported by mothers in late childhood predicted a more rapid increase in depressive symptoms throughout adolescence (Kouros & Garber, 2014). This relationship may vary across genders, as shown by a Dutch study ($N = 1,313$) which found
that self-reported relationship quality with fathers predicted depressive symptoms for males only (Branje et al., 2010). However, relationship quality with mothers predicted depressive symptomatology in both males and females. The USA National Longitudinal Survey of Youth ($N = 4,671$) found that the relationship between parent-adolescent relationship quality and mental health was mediated by family routines ($r = 0.12$), parental monitoring ($r = 0.10$), parental supportiveness ($r = 0.10$) and strictness ($r = 0.05$) (Hair et al., 2008). Overall, the current evidence base provides preliminary support for the parent-child relationship as a risk factor for depression; however, it suggests this association may be mediated by other factors.

**Poor family management.** Family management practices is a term that is used in the literature to describe a collection of family characteristics including discipline practices, the clarity around family rules and the level of parental monitoring (Kuttler, Schwendemann, & Bitzer, 2015). The association between family management and adolescent health outcomes has been more commonly studied with externalising problems such as alcohol consumption. Few studies have examined the association between poor family management and adolescent depression. Two aspects of family management practices, parental monitoring and inconsistent discipline, were examined in a recent meta-analysis (Yap et al., 2014). From this meta-analysis, the cross-sectional evidence demonstrated at strong association between lack of parental monitoring and depressive symptoms in adolescence. The longitudinal evidence suggested that a lack of parental monitoring increased the risk of depression in adolescents. However, the effect size was small ($r = - 0.135$). In regards to inconsistent discipline, four cross-sectional studies identified a significant association. However, there were no longitudinal studies identified and thus the direction of this association cannot be determined. Overall, the current evidence suggests parental monitoring may be temporally associated with an increased risk for depression; however, evidence regarding other aspects of poor family
management are limited. Further longitudinal studies are required to examine the association between poor family management and depression.

**School-level variables.** During adolescence, young people spend less time with their families and increased time at school and with their peers. The evidence discussed below suggests that the school environment plays a role in the development of adolescent depression. Table 6 summarises evidence for three school-level factors: bullying victimisation, academic failure and peer connectedness.
### Table 6

**Summary of Studies Examining School-level Factors Associated with Depression in Adolescents**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths: Comprehensive review using systematic approach to evaluate evidence of solely longitudinal studies, thus able to identify temporal associations.</th>
<th>Limitations: Unable to discern gender effects.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bullying victimisation</td>
<td>Depression</td>
<td>Systematic review</td>
<td>A systematic review of longitudinal studies indicates that adolescents who had been victims of bullying were at significantly greater risk (OR = 2.08) risk of depression compared to their peers who had not been bullied (Farrington, Losel, Ttofi, &amp; Theodorakis, 2012).</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(N = 30 studies)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Bullying victimisation</td>
<td>Depression</td>
<td>Longitudinal</td>
<td>A series of longitudinal studies have demonstrated that being bullied in childhood or adolescence is a significant predictor of depression in adolescence (Bond, Carlin, Thomas, Rubin, &amp; Patton, 2001; Farrington, Loeber, Stallings, &amp; Ttofi, 2011; Kaltiala-Heino, Frojd, &amp; Martunen, 2010; Ozdemir &amp; Stattin, 2011).</td>
<td>Strengths: Longitudinal design using mostly large samples from multiple countries including an Australian sample (Bond et al., 2001).</td>
<td>Limitations: Many studies had short follow-up periods, some as little as one year later, which means only part of the adolescent developmental period was assessed. Self-reported mental health symptoms.</td>
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Table 6 (cont.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths:</th>
<th>Limitations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic failure</td>
<td>Depression</td>
<td>Meta-analysis ($N = 43$ studies)</td>
<td>A meta-analysis of longitudinal studies of individuals (pooled $N = 24,557$) across the lifespan, revealed that low academic achievement was associated with increased levels of depressive symptoms over time. The effect was stronger in childhood and adolescence compared to adulthood (Huang, 2013).</td>
<td></td>
<td>Majority of studies from America (41 studies) thus results may not be generalisable to other populations. Studies included different measures of academic performance such as self-reported by students, parents, teachers and peers.</td>
</tr>
<tr>
<td>Academic failure</td>
<td>Depression</td>
<td>Longitudinal</td>
<td>Longitudinal evidence demonstrated that academic difficulties predicted depressive symptoms in adolescence (Gerard &amp; Buehler, 2004; Herman, Lambert, Reinke, &amp; Ialongo, 2008; McCarty et al., 2008; Morales &amp; Guerra, 2006; Undheim &amp; Sund, 2005).</td>
<td>Strengths: Longitudinal design. Controlled for a range of confounding/mediating variables.</td>
<td>Limitations: Longitudinal design of short duration (Undheim &amp; Sund, 2005). The use of non-representative samples.</td>
</tr>
<tr>
<td>Peer connectedness</td>
<td>Depression</td>
<td>Longitudinal</td>
<td>Several studies have found that fewer friends or poor friendships quality predicted increased levels of depressive symptoms (Buck &amp; Dix, 2012; Chen, Huang, Wang, &amp; Chang, 2012; Costello, Swendsen, Rose, &amp;</td>
<td>Strengths: A large number of longitudinal studies have replicated the results.</td>
<td>Limitations: The use of arbitrary cut-off scores for measures of quantity or quality of peer relationships.</td>
</tr>
</tbody>
</table>
Table 6 (cont.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths and limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer connectedness</td>
<td>Depressive symptoms</td>
<td>Cross-sectional</td>
<td>Cross-sectional studies found an association between peer relationships and depressive symptoms in adolescence (Denny, Clark, Fleming, &amp; Wall, 2004; Gaspar de Matos, Barrett, Dadds, &amp; Shortt, 2003).</td>
<td><strong>Strengths:</strong> The use of New Zealand and Portuguese samples to generate cross-cultural findings. <strong>Limitations:</strong> Cross-sectional design.</td>
</tr>
</tbody>
</table>

*Note.* D = Depression (multiple forms analysed); DS = Depressive symptoms; IS = Internalising symptoms; MDD: Major depressive disorder.
**Bullying victimisation.** In a systematic review of 30 longitudinal studies, evidence indicates that adolescents who have been bullied are at greater risk for depression Farrington et al., 2012). Longitudinal evidence was collected in several large studies using representative samples from the USA (Farrington et al., 2011), Finland (Kaltiala-Heino et al., 2010), Sweden (Ozdemir & Stattin, 2011) and Australia (Bond et al., 2001). However, when controlling for peer relationships and demographic factors in the Australian study, only recurrent episodes of bullying were predictive of depressive symptoms in females (OR = 1.36) not males. Overall, the current evidence base is strong and suggests bullying victimisation increases the risk of depressive symptoms; however, some evidence suggests that this effect may be stronger in females.

**Academic failure.** In a meta-analysis of 43 longitudinal studies, results showed a weak negative association ($r = -0.15$) between academic failure and subsequent depressive symptoms among children and adolescents (Huang, 2013). Inspection of specific longitudinal studies with adolescent samples, suggests that low academic achievement is temporally associated with an increased risk of depressive symptoms in adolescence (Gerard & Buehler, 2004; Herman et al., 2008; McCarty et al., 2008; Morales & Guerra, 2006; Undheim & Sund, 2005). Overall, the current evidence base suggests that academic failure is associated with an increased risk of depressive symptoms in adolescence.

**Peer connectedness.** Several longitudinal studies demonstrate that friendship quality and feeling connected with peers is temporally associated with higher levels of depressive symptoms (Buck & Dix, 2012; Chen et al., 2012; Costello et al., 2008; Prinstein et al., 2005; Schwartz et al., 2008; Zimmer-Gembeck et al., 2009). In the National Longitudinal Study of Adolescent Health ($N = 11,559$), participants who reported feeling more connected with their peers were less likely to experience depressive symptoms (OR = 0.67) over the six-year study period (Costello et al., 2008). Poorer friendship quality (Buck & Dix, 2012; Chen et al.,
2012) and fewer friends (Schwartz et al., 2008) is also longitudinally associated with an increased risk of depressive symptoms. Overall, the evidence base consistently suggests poorer peer relationship is associated with an increased risk of depressive symptoms in adolescence.

**Community-level variables.** It is well-established that community factors predict externalising problems such as defiance, aggression, violence and substance abuse (Fowler, Tompsett, Braciszewski, Jacques-Tiura, & Baltes, 2009; Hawkins et al., 2000; Ingoldsby & Shaw, 2002; Leventhal & Brooks-Gunn, 2000). These studies have found that children reared in disadvantaged neighbourhoods characterised by poverty, high rates of crime, and the presence of gangs and violence are at increased risk of developing externalising problems in adolescence. While neighbourhood characteristics are critical factors in the development of externalising problems, this is an emerging area of research in relation to internalising problems such as depression. Table 7 presents emerging evidence regarding two community-level factors as predictors of depression in adolescents: neighbourhood disorganisation and neighbourhood connectedness.
### Table 7

**Summary of Studies Examining Community-level Factors Associated with Depression in Adolescents**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neighbourhood disorganisation</td>
<td>DS</td>
<td>Longitudinal</td>
<td>In a South African sample of individuals aged 15 and over, ( N = 13,593 ), higher scores of neighbourhood disorganisation at Time 1 were associated with increased depressive symptoms two years later (Tomita, Labys, &amp; Burns, 2015).</td>
<td>Strength: Longitudinal design.</td>
<td>Limitations: Sampled mostly adults, findings may not be generalisable to adolescent samples.</td>
</tr>
<tr>
<td>Neighbourhood disorganisation</td>
<td>DS</td>
<td>Cross-sectional</td>
<td>In a US sample of Latino adolescents ( N = 383 ), the effects of neighbourhood disorganisation on depressive symptoms was examined. Neighbourhood disorganisation was indirectly associated with depressive symptoms (via self-esteem) in boys, but not in girls (Behnke, Plunkett, Sands, &amp; Bamaca-Colbert, 2010).</td>
<td>Strength: Meta-analysis.</td>
<td>Limitations: No longitudinal studies identified, thus temporal ordering cannot be identified. Conservative statistical estimates used, which may be unable to detect significant effects.</td>
</tr>
<tr>
<td>Neighbourhood disorganisation</td>
<td>DS</td>
<td>Cross-sectional</td>
<td>In four Caribbean countries ( N = 1955 ), higher levels of perceived neighbourhood crime predicted increases in depressive symptoms (Lowe et al., 2014).</td>
<td>Strength: Multi-country study of developing countries.</td>
<td>Limitations: Cross-sectional design.</td>
</tr>
<tr>
<td>Neighbourhood attachment</td>
<td>D</td>
<td>Meta-analysis</td>
<td>From four cross-sectional studies, the combined effect of neighbourhood attachment on depressive symptoms was not significant. Further analysis of these four studies suggests that protective effects of neighbourhood attachment on depressive symptoms may be mediated by other variables such as neighbourhood disadvantage and organisational participation (Stirling, Toumbourou, &amp; Rowland, 2015).</td>
<td>Strength: Meta-analysis.</td>
<td>Limitations: Conservative statistical estimates used, which may be unable to detect significant effects.</td>
</tr>
</tbody>
</table>
Table 7 (cont.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outcome</th>
<th>Study design</th>
<th>Summary of findings</th>
<th>Strengths and limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neighbourhood attachment</td>
<td>DS</td>
<td>Cross-sectional</td>
<td>In a US sample of early adolescents ($N = 437$), participants reporting more than one above average connection (neighbourhood, school or family), as determined by averaging scores across participants, reported lower depressive symptoms than participants with none or one above average connections. Neighbourhood connection was a significant predictor of depressive symptoms when considered in conjunction with connectedness in other domains (Witherspoon, Schotland, Way, &amp; Hughes, 2009).</td>
<td><strong>Strengths:</strong> Takes a multi-level approach to connectedness and explores connectedness across three domains.</td>
</tr>
<tr>
<td>Neighbourhood attachment</td>
<td>DS</td>
<td>Cross-sectional</td>
<td>In a US sample ($N = 810$) of early adolescents aged 10 to 12 years, higher levels of community cohesion were significantly associated with lower levels of depressive symptoms (Simons et al., 2002).</td>
<td><strong>Strengths:</strong> Use of a multi-level approach that included individual and community variables. <strong>Limitations:</strong> Cross-sectional design.</td>
</tr>
</tbody>
</table>

Notes: D = Depression, DS = Depressive symptoms, MDD: Major Depressive Disorder, US = United States of America
**Neighbourhood disorganisation.** Neighbourhood disorganisation is often defined as visual signs of crime, violence and gangs within neighbourhoods (Behnke et al., 2010; Tomita et al., 2015). In South Africa, longitudinal evidence suggests that perceived higher levels of neighbourhood disorganisation is a predictor of depressive symptoms two years later (Tomita et al., 2015). Cross-sectional evidence \((N = 1955)\) from a study of four Caribbean countries, suggested that higher levels of perceived crime was associated with increasing depressive symptoms (Lowe et al., 2014). However, cross-sectional evidence from a small US study \((N = 383)\) of Latino adolescents the results suggest that this association is mediated by self-esteem in boys. While in girls, neighbourhood disorganisation was not a significant predictor of depression either directly or indirectly (Behnke et al., 2010). Due to the cross-sectional design of this study, no conclusions regarding causality could be drawn. Preliminary longitudinal evidence suggests that neighbourhood disorganisation may be associated with an increased risk of depressive symptoms in adolescence, however, more longitudinal studies are needed.

**Neighbourhood attachment.** Neighbourhood attachment is defined as a sense of connection to one’s neighbourhood (Witherspoon et al., 2009). Cross-sectional evidence demonstrates there is a significant association between neighbourhood attachment and depression (Simons et al., 2002; Witherspoon et al., 2009). However, findings from a meta-analysis of four cross-sectional studies suggest that the effects of neighbourhood attachment are mediated by other risk factors (Stirling et al., 2015). Overall, evidence is limited and longitudinal studies are needed to further investigate the relationship.

**Conclusion**

This chapter provided a summary and critical appraisal of the evidence base regarding risk and protective factors for adolescent depression. Seven individual-level risk factors, four family-level risk factors, three school-level risk factors and two community-level risk factors
were identified. The evidence base was strongest for individual-, family- and school-level risk factors with the majority of factors within these domains supported by meta-analytical evidence. In regards to parental depression, parent-child relationship and peer connectedness there were at least two longitudinal studies that demonstrated each factor predicted an increase in depressive symptoms. There is preliminary support from one longitudinal study and several cross-sectional studies that suggests that perceiving oneself as overweight is associated with higher levels of depressive symptoms. In regards to community-level factors, more longitudinal studies are needed to examine whether these factors are associated with an increased risk of depressive symptoms. In regards to the current thesis, the variables reviewed in this chapter will be used in the empirical studies, when available within the datasets, to control for confounding effects on the association between alcohol consumption as a risk factor for depression in adolescence.
Chapter 4: Literature Review Examining Alcohol Consumption as a Risk Factor for Adolescent Depression

Chapter Overview

This chapter builds on previous chapters, which have provided a critical overview of the scope and nature of the problem, a developmental framework and examined evidence for risk factors for depression in adolescence. This chapter focuses specifically on the research questions posed in this thesis. It presents a systematic review of cross-sectional and longitudinal studies that have examined the association between alcohol consumption as a predictor of depression in adolescence. It explores whether age and biological sex moderate the association, and examines non-linear associations between alcohol consumption and depression in adolescents.

Co-occurring Alcohol Consumption and Depression in Adolescence

As demonstrated in Chapter 3, a wide range of factors have been shown to be associated with adolescent depression. This chapter specifically examines the association between alcohol consumption and depression. There is an increasing number of studies examining the co-occurrence between alcohol consumption and depression. Most of these studies, however, have examined this association through a self-medication and treatment perspective (Merikangas et al., 2010). Less attention has been given to developmental aspects of this association and the reverse hypothesis - that alcohol consumption increases the risk of depression.

In the course of a lifetime, depression (Kessler et al., 2001) and alcohol consumption (AIHW, 2014; Steketee et al., 2013) often emerge in adolescence. The prevalence of each increases steadily during adolescence (Costello et al., 2003; Johnston et al., 2015; Kessler et al., 2001; White & Bariola, 2012). Both outcomes are associated with poor psychosocial
functioning in adolescence and adulthood (Gore et al., 2011; Newbury-Birch et al., 2009).
Depression and early alcohol use in adolescence are also strong predictors of similar
problems in adulthood (Goodwin et al., 2004; Hingson, Heeren, & Winter, 2006). Individuals
who experience adolescent-onset depression tend to experience recurrent episodes in
adulthood (Birmaher et al., 1996; Kessler, 2001; Lewinsohn et al., 2000; Wight, 2004).
Adolescent-onset depression is often also associated with a more severe course than
depression that has an age-of-onset in adulthood (Pine et al., 1999; Aalto-Setala et al., 2014).
The evidence suggests adolescence is a critical period for intervening to reduce the incidence
and severity of depression across the lifespan.

**Alcohol consumption as a risk factor for depression.** To date, longitudinal studies
that have examined the reverse hypothesis in adolescent samples have predominantly focused
on examining whether Alcohol Use Disorder (AUD) in adolescence is a predictor of
depression in early adulthood (Mason et al., 2008; Needham, 2007). In a USA sample ($N =
816$), AUD at ages 16 to 17 predicted Major Depressive Disorder (MDD) in early adulthood
(Briere et al., 2014). Furthermore, AUD in adolescence preceded the onset of MDD in
adulthood in 57% of cases. These findings replicated previous results in a US longitudinal
study that identified that adolescent problem drinking predicted MDD in a person’s late
twenties (Brook, Brook, Zhang, Cohen, & Whiteman, 2002). Similar results emerged in a
highly regarded New Zealand longitudinal study ($N = 1055$) of participants sampled from
birth, with over 80% retention. This study examined two models: AUD precedes MDD, and
MDD precedes AUD (Fergusson et al., 2009). Structural equation modelling indicated that
the best-fitting model was the one where AUD at age 17 predicted MDD at ages 20 to 25.

In adolescent samples, the rates of comorbid AUD and MDD are low (approximately
2%) due to the low rates of AUD during adolescence (Briere et al., 2014). AUD most
commonly has an age of onset in early adulthood (Hingson et al., 2006; Kessler, 2007).
Patterns of heavy drinking during adolescence tend to be less common, with approximately 4% of early adolescents and 10% of mid-adolescents classified as heavy drinkers (Van Der Vorst, Vermulst, Meeus, Dekovic, & Engels, 2009). While many Australian adolescents engage in binge drinking (five or more drinks during the one occasion), the prevalence is less frequent than other lower level patterns of consumption such as experimental use (Bridle, Miller, King, & Christou, 2012). The consumption of alcohol at non-clinical levels is often considered a normative part of adolescent development (Masten et al., 2009). Therefore, it is important for prevention research to ascertain whether early non-clinical alcohol consumption is predictive of depression in adolescence.

A recent meta-analysis of longitudinal studies examined the association between alcohol consumption and depression in adolescence (Cairns et al., 2014). This study included 14 longitudinal studies that examined the association with a measure of the frequency of alcohol consumption, and four studies that examined this association with a measure of the quantity of alcohol consumption. A small but significant effect size was found for the association between more frequent alcohol use and higher levels of depressive symptoms ($r = 0.059, p < 0.001$), and greater quantity of alcohol consumption and depressive symptoms ($r = 0.119, p < 0.01$). The effect size was larger for older adolescents (16-18 years) relative to younger adolescents (12-15 years).

Of the 14 studies that examined the association in relation to alcohol frequency, however, seven examined whether alcohol frequency in adolescence was a predictor of depression in early adulthood (Brook et al., 2002; Carvajal, 2012; Duncan, Alpert, Duncan, & Hops, 1997; Gustafson, 2011; Kiff et al., 2012; Pelkonen, Marttunen, Kaprio, Huurre, & Aro, 2008). One study examined the effects of the frequency of alcohol consumption on the number of extracurricular activities not depression (Fredricks & Eccles, 2010) and another study examined the self-medication hypothesis; thus, alcohol consumption was modelled as
the dependent variable in the analyses (McCarty et al., 2012). Therefore, the results of this meta-analysis may not be generalisable to adolescent populations.

In relation to quantity of alcohol consumption, of the four studies included, two examined the temporal association from adolescence into early adulthood and one used the number of extracurricular activities as the dependent variable (Denault & Poulin, 2009). The results drawn from this meta-analysis are based on studies that either did not examine the effects on internalising mental health problems or examined the reverse hypothesis across a different developmental period. Thus, to date, there has been no published comprehensive review of the literature that has examined the reverse hypothesis, that alcohol consumption precedes depressive symptoms, exclusively within adolescence. The next section presents a systematic review that examines the association between alcohol consumption as a risk factor for depression in adolescence.

**Non-linear associations.** In addition, it is important to examine other aspects of this association within adolescent populations, in particular, whether the relationship is non-linear and whether non-linear associations are developmentally linked. This may be important as studies of adult drinking have demonstrated a J-shaped relationship (see Figure 2, below). Following a J-shape, in cross-sectional (Caldwell et al., 2002; Coelho et al., 2014; Peele & Brodsky, 2000; Rodgers et al., 2000) and longitudinal (Alati et al., 2005; Skogen et al., 2009) studies, non-drinkers and heavy drinkers were found to be at greater risk of depressive symptoms compared to moderate drinkers (no more than 1 to 2 standard drinks per day).
Similarly, a large cross-sectional study (N = 15,748) of young adult (aged 17-30) university students from across 20 countries found that moderate drinkers experienced fewer depressive symptoms compared to non-drinkers (O'Donnell, Wardle, Dantzer, & Steptoe, 2006). In line with these findings, an Australian study (N = 2,404) of young adults (20-24 years) found the association followed a J-shaped pattern for only males (Caldwell et al., 2002), whereas for females, the association between alcohol use and depressive symptoms followed a linear pattern.

The current evidence for a J-shaped association in adolescence is less clear. Much remains unanswered about the temporal nature of this association in adolescence and at what ages drinking poses the greatest risk to mental health in adolescence. There are a number of explanations for the current situation within the literature. First, the reverse hypothesis, that alcohol consumption precedes depression, has received considerably less attention than the self-medication hypothesis, that depression precedes alcohol consumption (Marmorstein, 2009). Second, the measurement of alcohol consumption used to examine the association with depression varies widely across studies. For example, in studies examining the

Figure 2. An example graph of a J-shaped association, currently found with adult samples.
association with depression, alcohol consumption has been measured as age of first drink (Newton-Howes & Boden, 2016), lifetime alcohol consumption (Bazargan-Hejazi et al., 2010; Rodriguez et al., 2005), past week consumption (Clark et al., 2007), past 30 days consumption (Balogun et al., 2013; Owens et al., 2008; Poulin et al., 2004; Salom et al., 2016), lifetime drunkenness (Balogun et al., 2013), frequency of being drunk (Myklestad et al., 2012) and alcohol use related problems (Marmorstein, 2009). The association may vary across different types of drinking patterns (i.e. moderating drinking vs. heavy drinking vs AUD). Third, previous studies examining the reverse hypothesis in adolescence have assessed whether alcohol consumption is a predictor of depression in early adulthood (Boden & Fergusson, 2011; Briere et al., 2014; Brook et al., 2002; Fergusson et al., 2009).

**Method**

A review of the literature was undertaken to examine the association between alcohol consumption as a predictor of depression in adolescent samples. A systematic search of seven electronic databases was conducted: Academic Search Complete, CINAHL complete, ERIC, Global Health, MEDLINE Complete, PsychARTICLES and PsychINFO. A simultaneous combination of the following search terms included: (depression OR depressive OR psychological distress OR mental health OR mental illness OR internalising OR internalizing) AND (alcohol) AND (adolescen* OR teenager OR youth). The original search was conducted in April 2015 and subsequently updated in June 2016. Studies in English published in full peer reviewed journals between 1980 to June 2016 were included.

Eligible studies met the following criteria: (a) alcohol consumption was identified in the study as the predictor variable; (b) the dependent variable was internalising symptoms, such as depression or psychological distress; and (c) participants were adolescents ranging from age 11 to 18. Studies were excluded if the only measure of alcohol consumption was AUD, as the focus of this review is on non-clinical alcohol consumption and more prevalent
drinking patterns in adolescence. Studies were excluded if they examined the self-medication hypothesis; thus, alcohol consumption was entered at the dependent variable. Longitudinal studies were also excluded if alcohol consumption was only examined as a predictor of internalising symptoms in early adulthood (18 years and older).

Results

Eighteen eligible studies were identified. Studies were from predominantly developed countries. In approximately half of the studies, the dependent variable was depressive symptoms. Other dependent variables used less frequently were mental health problems, depressive affect, MDD, psychological distress and depressive episode. The measure of alcohol consumption was used as the independent variable differed across studies. Measures included lifetime alcohol consumption, AFD, frequency of alcohol consumption, quantity of alcohol consumption, regular alcohol consumption, weekly alcohol consumption, drinking to intoxication, excessive alcohol consumption (i.e. > 90th percentile), regular intoxication (i.e. > 10 occasions), alcohol use-related problems and lifetime drunkenness. The majority of studies (n = 12) controlled for at least six covariates, although the covariates varied widely across studies. Four studies controlled for only basic demographic variables and two did not control for any covariates.

Studies were assessed using the National Health and Medical Research Council evidence base matrix (NHMRC, 2009b). Of the 18 studies identified for inclusion in the review, nine were cross-sectional and nine were longitudinal, and were organised according to their methodological design. The review focused on examining the literature in relation to three aspects of the association between alcohol consumption as a predictor of depressive symptoms. Specifically, whether age or sex moderated the association, and whether a non-linear association exists.
Cross-sectional studies. There were nine cross-sectional studies identified. These studies are summarised in Table 8.
### Table 8

**Summary of Cross-sectional Studies Examining the Association between Alcohol Consumption as a Predictor of Depression in Adolescents**

<table>
<thead>
<tr>
<th>Study design/Reference</th>
<th>N</th>
<th>Countries</th>
<th>Demographics</th>
<th>Predictor variable/s</th>
<th>Outcome variable</th>
<th>Covariates</th>
<th>Summary of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-sectional</td>
<td>32,001</td>
<td>Botswana, Grenda, Indonesia, Kenya, Myanmar, Philippines, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Thailand, Trinidad and Tobago, Uganda</td>
<td>13-15 years ($M$ = not reported)</td>
<td>Past 30 days alcohol use</td>
<td>Psychological distress</td>
<td>-</td>
<td>Past 30 days alcohol consumption was significantly associated with higher levels of psychological distress symptoms in all countries except Indonesia, Myanmar and Saint Vincent. Lifetime drunkenness was significantly associated with psychological distress in all countries, except Myanmar.</td>
</tr>
<tr>
<td>Cross-sectional</td>
<td>3892</td>
<td>USA</td>
<td>12-17 ($M$ = not reported)</td>
<td>Lifetime alcohol use</td>
<td>Depressive symptoms</td>
<td>Age, Sex, Race, Family type, Poverty level, Perceived health, Self-care, Health insurance, Cigarette use, Perception of weight, Trying to change weight, Parents’ perception of need for counselling</td>
<td>Alcohol use was significantly associated with an increased risk of depressive symptoms (OR = 2.06).</td>
</tr>
</tbody>
</table>
Table 8 (cont.)

<table>
<thead>
<tr>
<th>Study design/Reference</th>
<th>N</th>
<th>Countries</th>
<th>Demographics</th>
<th>Predictor variable/s</th>
<th>Outcome variable</th>
<th>Covariates</th>
<th>Summary of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-sectional</td>
<td>8984</td>
<td>Norway</td>
<td>Age range: 12-20 years ($M_{age} = 16.0$)</td>
<td>Frequency of being drunk</td>
<td>Psychological distress</td>
<td>Sex, Age, Economic problems, Parental unemployment, Parents’ social network, Parents’ psychological distress, Parents’ alcohol use, Parental separation, Parent living alone, Parent drunkenness, Adolescent’s social support from friends, Structured leisure time, Social leisure time, Academic problems, Dissatisfaction with school, Conduct problems, Bullied at school, Smoking</td>
<td>A significant interaction between sex and frequency of being drunk ($\beta = 0.12, p &lt; 0.001$) on psychological distress was identified. This result indicated that higher frequency of being drunk had a stronger effect on females’ psychological distress compared to males. No significant interaction between age and frequency of being drunk on psychological distress was identified.</td>
</tr>
</tbody>
</table>

History of accessing counselling
Table 8 (cont.)

<table>
<thead>
<tr>
<th>Study design/Reference</th>
<th>$N$</th>
<th>Countries</th>
<th>Demographics</th>
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<th>Outcome variable</th>
<th>Covariates</th>
<th>Summary of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-sectional</td>
<td>12,771</td>
<td>Canada</td>
<td>$M$ age = 15.2, 50.1% males</td>
<td>Past 30 days alcohol consumption, including binge drinking</td>
<td>Depressive symptoms</td>
<td>Sex, Age, Province of residence, Urban/rural residence, Self-rated academic performance, Cigarette use, Cannabis use</td>
<td>Among females, participants who consumed alcohol in the past month were more likely to report somewhat elevated (OR = 2.15) and very elevated (OR = 1.81) depressive symptoms compared to those who had not consumed alcohol. For females only, there was a significant interaction between binge drinking and age. Younger adolescents who engaged in binge drinking were at the highest risk of very elevated depressive symptoms. This risk associated with binge drinking decreased with increasing age. Past 30 days alcohol consumption and binge drinking were not associated with an increased risk of elevated depressive symptoms in males.</td>
</tr>
<tr>
<td>Cross-sectional</td>
<td>7289</td>
<td>Australia</td>
<td>$M$ age: 11.6, 48% males</td>
<td>Past 30 days alcohol consumption</td>
<td>Depressive symptoms</td>
<td>Sex, Age, Cultural background, SES, Family conflict, Family substance problems, Family closeness, Coping skills</td>
<td>Of all participants, 5.7% reported co-occurring current drinking and depressive symptoms. Recent drinkers were more likely to self-report clinical levels of depressive symptoms than non-drinkers (OR = 1.80, CI: 1.58 - 2.03).</td>
</tr>
<tr>
<td>Study design/Reference</td>
<td>N</td>
<td>Countries</td>
<td>Demographics</td>
<td>Predictor variable/s</td>
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<tr>
<td>Cross-sectional</td>
<td>9203</td>
<td>Norway</td>
<td>Age range: 17 – 19( (M = 17.9))</td>
<td>Lifetime alcohol consumption</td>
<td>Depressive symptoms</td>
<td>Age, Sex, SES</td>
<td>A significant interaction between sex, frequent intoxication and excessive alcohol consumption was found, thus frequent intoxications was associated with an increased risk of depressive symptoms in males (OR = 1.83, CI: 1.32, 2.52) but not females. Age did not moderate the association between alcohol consumption as a predictor of depressive symptoms. No J-shaped or U-shaped association was identified.</td>
</tr>
<tr>
<td>Cross-sectional</td>
<td>5730</td>
<td>Netherlands</td>
<td>Age range: 12-16 years (( M ) age not reported)</td>
<td>Regular alcohol consumption (weekly to every day consumption patterns)</td>
<td>Mental health problems</td>
<td>Regular smoking, Living with both parents, Family affluence, Social support</td>
<td>A significant interaction between weekly alcohol consumption and age was identified; thus, that regular weekly drinking (non-normative drinking behaviour) was associated with an increased risk of higher depressive symptoms in younger drinkers (12-13 years) compared to older drinkers (14-16 years). No significant interaction with sex identified.</td>
</tr>
<tr>
<td>Study design/Reference</td>
<td>N</td>
<td>Countries</td>
<td>Demographics</td>
<td>Predictor variable/s</td>
<td>Outcome variable</td>
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<tr>
<td>Cross-sectional (Yue et al., 2015)</td>
<td>19,578</td>
<td>China</td>
<td>$M$ age = 15.5 (SD = 1.7)</td>
<td>Past month alcohol consumption (at least one drink)</td>
<td>Depressive symptoms</td>
<td>Age, Sex, Grade, Living arrangements, Family SES, Parents’ education, Parental smoking, Parental alcohol use, Communication with parents, Number of siblings, Number of good friends, Relationship with teachers and peers, Pocket money, Academic pressure, Time spent doing homework</td>
<td>The association between alcohol consumption and depressive symptoms was stronger for female adolescents (OR = 2.1, CI: 1.8, 2.5) than males (OR = 1.7, CI: 1.4, 2.1).</td>
</tr>
<tr>
<td>Cross-sectional (Zinn-Souza et al., 2008)</td>
<td>724</td>
<td>Brazil</td>
<td>Age range: 14-18 years ($M$ age = 16.3)</td>
<td>Regular alcohol consumption</td>
<td>Depressive symptoms</td>
<td>Age, Sex, Number of people living in household, Parents’ marital status, Cigarette use, Physical activities, Family problems, School problems, Extracurricular activities</td>
<td>Regular alcohol consumption was a significant predictor of depressive disorders (OR = 2.35, CI: 1.24, 4.46).</td>
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Table 8 (cont.)

<table>
<thead>
<tr>
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<td>Time spent in leisure activities</td>
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<td>Financial problems</td>
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<td>Health status</td>
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</table>

Note. AFD = Age of first drink; MDD = Major depressive disorder; SES = Socio-economic status; UK = United Kingdom; USA = United States of America.
There were four studies that did not examine age or sex effects (Balogun et al., 2013; Bazargan-Hejazi et al., 2010; Salom et al., 2016; Zinn-Souza et al., 2008). All four studies reported direct significant effects. Three studies, using representative samples, identified a significant association between alcohol consumption and increasing levels of depressive symptoms (Balogun et al., 2013; Bazargan-Hejazi et al., 2010; Salom et al., 2016). However, no significant association between alcohol consumption and depressive symptoms was identified in Myanmar (Balogun et al., 2013). These studies used a variety of alcohol consumption measures including lifetime alcohol consumption (Bazargan-Hejazi et al., 2010), past 30 days alcohol consumption (Balogun et al., 2013; Salom et al., 2016), regular alcohol consumption (Zinn-Souza et al., 2008) and lifetime drunkenness (Balogun et al., 2013).

In the remaining cross-sectional studies identified, five examined whether the association was moderated by sex and four examined whether the association was moderated by age. In addition, one cross-sectional study examined non-linear associations (Salom et al., 2016). These findings will be discussed below.

**Sex.** Five cross-sectional studies examined sex differences in the relationship between alcohol consumption as a predictor of depressive symptoms in adolescents (Myklestad et al., 2012; Poulin et al., 2004; Skogen et al., 2014; Verdurmen et al., 2005; Yue, 2015). The results across the five studies were mixed. One study identified no significant interaction between alcohol consumption and sex on mental health problems (Verdurmen et al., 2005). Two studies identified a stronger association, in females relative to males, between the frequency of being drunk and increasing levels of psychological distress (Myklestad et al., 2012), and the association between past-month alcohol consumption and depressive symptoms (Yue et al., 2015). A Canadian study found that past month drinking was associated with increasing depressive symptoms in females only (Poulin et al., 2004);
however, in a representative Norwegian sample, frequent intoxication and excessive alcohol consumption was significantly associated with increasing depressive symptoms in males only (Skogen et al., 2014). Overall, the current cross-sectional evidence base is inconsistent in regards to whether the association is moderated by sex.

**Age.** A total of four cross-sectional studies examined whether the relationship between alcohol consumption as a predictor of depressive symptoms was moderated by age (Myklestad et al., 2012; Poulin et al., 2004; Skogen et al., 2014; Verdurmen et al., 2005. Two studies identified no mediating effects by age on the association between frequency of being drunk and psychological distress (Myklestad et al., 2012), and heavy alcohol consumption (frequent intoxications and excessive alcohol use) and depressive symptoms (Skogen et al., 2014). However, one of these studies included participants within a restricted age range in late adolescence (17 – 19 years), thus limited examination of age-related effects (Skogen et al., 2014).

Two studies identified a significant mediating effect of age on the association between alcohol consumption and depressive symptoms. One study, of adolescents aged 12 to 16, reported that regular weekly drinking was associated with increasing internalising symptoms in younger adolescents compared to older adolescents (Verdurmen et al., 2005). Similarly, another study found that binge drinking was associated with increasing depressive symptoms in younger adolescents compared to older adolescents, however this effect was only found for females not males (Poulin et al., 2004). Overall, preliminary cross-sectional evidence suggests that regular and heavy drinking may be more strongly associated with depressive symptoms in younger adolescents.

**Non-linear effects.** Despite a number of studies that have examined non-linear associations between alcohol consumption and depression in adulthood, only one cross-
sectional study with an adolescent sample was identified (Skogen et al., 2014). In a study, using a representative sample of Norwegian adolescents, no J- or U-shaped pattern in the association between heavy alcohol use (frequent intoxications and excessive alcohol use) and depressive symptoms was identified (Skogen et al., 2014). There is limited cross-sectional evidence examining non-linear associations among adolescents.

**Longitudinal studies.** There were nine longitudinal studies identified. These studies are summarised in Table 9.
Table 9

*Summary of Longitudinal Studies Examining Alcohol Consumption as a Risk Factor for Depression in Adolescents*

<table>
<thead>
<tr>
<th>Study design/ Reference</th>
<th>N</th>
<th>Countries</th>
<th>Demographics</th>
<th>Predictor variable/s</th>
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<th>Covariates</th>
<th>Summary of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal (Clark et al., 2007)</td>
<td>1615</td>
<td>UK</td>
<td>Baseline age: 11-12 (Yr 7), 12-14 (Yr 9)</td>
<td>Past week alcohol consumption</td>
<td>Psychological distress</td>
<td>SES, Ethnicity, General health status, Long-standing illness, Physical activity, Cigarette use, Illicit drug use</td>
<td>Alcohol consumption at Time 1 was significantly associated with an increased risk of psychological distress two years later (OR = 2.14, CI: 1.01, 4.51); although when controlling for baseline psychological distress, this effect was no longer significant (OR = 2.05, CI: 0.94-4.48). Alcohol consumption at Time 1 was not significantly associated with an increased risk of depressive symptoms in either model. No gender differences identified.</td>
</tr>
<tr>
<td>Longitudinal (Edwards et al., 2014a)</td>
<td>4292</td>
<td>UK</td>
<td>Median age at assessments: 12 years, 10 months; 13 years, 10 months; 15 years, 5 months; 17 years, 10 months</td>
<td>Drinking frequency (timeframe not reported)</td>
<td>Depressive symptoms</td>
<td>Housing tenure, Crowding status, Mother’s education, Maternal alcohol use, Maternal history of depression, Child conduct problems</td>
<td>Medium and high drinking frequency in early to mid-adolescence predicted depressive symptoms in late adolescence in both males (OR = 2.25, CI: 1.09, 4.66; OR = 2.54, CI: 1.06 – 6.10) and females (OR = 1.63, CI: 1.04-2.55; 1.93, CI: 1.08, 3.44), although the effect was stronger among males.</td>
</tr>
</tbody>
</table>
### Table 9 (cont.)

<table>
<thead>
<tr>
<th>Study design/Reference</th>
<th>N</th>
<th>Countries</th>
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<th>Covariates</th>
<th>Summary of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal</td>
<td></td>
<td>USA</td>
<td>M age at baseline: 12.94 years</td>
<td>Frequency of alcohol use</td>
<td>Depressive symptoms</td>
<td>Sex Age Marijuana use Cigarette use Baseline symptoms Changes in symptoms</td>
<td>Tested mediation effect of drinking during late adolescence, and found that drinking during early to mid-adolescence was a specific risk factor for depression in late adolescence that was not mediated by alcohol use in late adolescence.</td>
</tr>
<tr>
<td>(Fleming et al., 2008)</td>
<td>951</td>
<td>USA</td>
<td>M age at baseline: 12.94 years</td>
<td>Frequency of alcohol use</td>
<td>Depressive symptoms</td>
<td>Sex Age Marijuana use Cigarette use Baseline symptoms Changes in symptoms</td>
<td>Alcohol use greater than would be expected, given an individual’s average level and rate of change in drinking during adolescence, was a significant predictor of increases in depressive symptoms. No sex differences identified.</td>
</tr>
<tr>
<td>Longitudinal</td>
<td>4412</td>
<td>Canada</td>
<td>M age at baseline: 14 years, 6 months</td>
<td>Alcohol frequency</td>
<td>Depressive symptoms</td>
<td>Sex Age Parental education Cigarette use Marijuana use Illicit drug use Delinquency</td>
<td>Alcohol frequency and amount in Year 9 did not predict increases in depressive symptoms in Year 12 (M age = 17 years, 5 months).</td>
</tr>
<tr>
<td>(Hooshman, Willoughby, &amp; Good, 2012)</td>
<td></td>
<td></td>
<td>M age at baseline = 15.66 years / % males/females not reported</td>
<td>Alcohol-use-related problems</td>
<td>Depressive symptoms</td>
<td>Sex Age</td>
<td>Higher initial levels of alcohol-use-related problems were associated with increased risk of depressive symptoms; however, this effect was moderated by age.</td>
</tr>
<tr>
<td>Longitudinal</td>
<td>20.728</td>
<td>USA</td>
<td>M age at baseline = 15.66 years / % males/females not reported</td>
<td>Alcohol-use-related problems</td>
<td>Depressive symptoms</td>
<td>Sex Age</td>
<td>Higher initial levels of alcohol-use-related problems were associated with increased risk of depressive symptoms; however, this effect was moderated by age.</td>
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</thead>
<tbody>
<tr>
<td>Longitudinal (Newton-Howes &amp; Boden, 2016)</td>
<td>1065</td>
<td>New Zealand</td>
<td>Age at assessment: birth, 1 year and annually to 16 years, and again at ages 18, 21, 25, 30, and 35 years.</td>
<td>AFD</td>
<td>MDD</td>
<td>Maternal age Family living standards Family SES Parental education Single parent at birth Average family income Maori ethnic sex Child conduct problems Neuroticism Novelty seeking Parental substance use Parental criminality Parent attitudes to alcohol use Parental attachment</td>
<td>Earlier AFD (age 11–13) was not significantly associated with later depression (15 – 35 years). The effects of alcohol-use-related problems on depressive symptoms was strongest at younger ages and this effect gradually decreased; thus, by age 21 there was no significant difference between participants with high and low alcohol problems. The effect was strongest for females, with high alcohol-use problems following a linear decreasing pattern across age, compared to males, which followed a more curvature pattern.</td>
</tr>
<tr>
<td>Study design/Reference</td>
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<tr>
<td>Longitudinal</td>
<td>856</td>
<td>USA</td>
<td>Age at baseline: 9th Grade (M age not reported) 53% males</td>
<td>Number of drinking occasions in the past 30 days</td>
<td>Depressive affect</td>
<td>Sex Academic results</td>
<td>Adolescents who consumed alcohol less often in 9th Grade reported slower increases in depressive affect with increasing age compared to adolescents who consumed alcohol more frequently at baseline. However, increases in depressive affect among low level drinkers at baseline was not even between changes in drinking frequency with increases in depressive affect becoming increasingly larger over time. This increase in depressive affect was significantly stronger for females compared to males.</td>
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<td>(Owens et al., 2008)</td>
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<tr>
<td>Longitudinal</td>
<td>925</td>
<td>USA</td>
<td>Age at baseline: 9th Grade (M age not reported) 48% males</td>
<td>Lifetime alcohol consumption frequency</td>
<td>Depressive symptoms</td>
<td>Sex Race Marijuana use Cigarette use Academic performance Non-sport extracurricular activities Peer smoking Household smoking Physical activity</td>
<td>Adolescents who had consumed alcohol more frequently in their lifetime at baseline (OR = 1.36; CI: 1.08, 1.71) were more likely to experience higher levels of depressive symptoms.</td>
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<tr>
<td>(Rodriguez et al., 2005)</td>
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</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal</td>
<td>1242</td>
<td>Norway</td>
<td>Age at baseline: 13-15 years (<em>M</em> age not reported) 53.4% males</td>
<td>Frequency of alcohol consumption Drinking to intoxication</td>
<td>Depressive symptoms</td>
<td>-</td>
<td>Alcohol consumption frequency and intoxication ‘early onset – high’ pattern at age 13 was associated with higher levels of depressive symptoms with increasing age compared to ‘late onset’ and ‘stable low’ drinking patterns.</td>
</tr>
</tbody>
</table>

*Note*: AFD = Age of first drink, MDD = Major Depressive Disorder, SES = Socio-economic status, UK = United Kingdom, USA = United States of America.
There were four longitudinal studies that did not examine for potential mediating effects of either age or sex (Hooshmand et al., 2012; Newton-Howes & Boden, 2016; Rodriguez et al., 2005; Skogen, 2016). Two of these studies reported no direct significant effects (Hooshmand et al., 2012; Newton-Howes & Boden, 2016). In a Canadian sample of adolescents, more frequent drinking and greater quantities of alcohol consumption in Year 9 did not predict depressive symptoms in Year 12 (Hooshmand et al., 2012). In a New Zealand birth cohort study, the AFD between the ages of 11 and 13 did not significantly predict MDD at 15 years and older (Newton-Howes & Boden, 2016). This finding may be due to the use of AFD as a measure of alcohol consumption. AFD has poor test-retest reliability and poor validity as an indicator of drinking behaviour and associated outcomes (Kuntsche, Rossow, Engels, & Kuntsche, 2016). Current and continued alcohol use is likely to be more strongly linked with mental health outcomes in adolescents.

Conversely, two longitudinal studies identified direct significant effects (Rodriguez et al., 2005; Skogen et al., 2016). In a Norwegian representative birth cohort study, early-onset (prior to age 15) drinking at high levels was associated with an increased risk of depressive symptoms with increasing age, compared to late-onset drinking, early onset at low levels and stable low drinking patterns (Skogen et al., 2016). However, all early onset drinking patterns, including at low levels, were associated with higher levels of depressive symptoms from early to late adolescence, compared to late-onset drinking. In a USA sample, adolescents who had consumed alcohol more frequently in their lifetime reported significantly higher levels of depressive symptoms (Rodriguez et al., 2005).

A further five longitudinal studies were identified that examined whether either age, biological sex or both moderated the association between alcohol consumption and depressive symptoms. One longitudinal study examined non-linear associations. These findings will be discussed below.
Sex. Five longitudinal studies examined sex differences in the relationship between alcohol consumption as a risk factor for depressive symptoms in adolescents (Clark et al., 2007; Edwards et al., 2014a; Fleming et al., 2008; Marmorstein, 2009; Owens et al., 2008). Like the cross-sectional studies, results across these studies were inconsistent. One study found that higher than average alcohol consumption frequency predicted later depressive symptoms, and also identified no differences in the relationship between sexes (Fleming et al., 2008). Another study identified no mediating sex effects on the temporal association between past-week alcohol consumption and depressive symptoms, or past-week alcohol consumption and psychological distress (Clark et al., 2007). However, alcohol consumption in early adolescence was also not a significant predictor of psychological distress or depressive symptoms after controlling for baseline depressive symptoms (Clark et al., 2007).

Conversely, other studies identified differences in the association between males and females. Two studies reported a stronger temporal association among females relative to males in the association between alcohol-use-related problems and depressive symptoms (Marmorstein, 2009), and past 30 days alcohol consumption and depressive symptoms (Owens et al., 2008). However, one study identified a stronger association between drinking frequency as a predictor of depressive symptoms among males relative to females (Edwards et al., 2014a). Overall, the current longitudinal evidence base is also inconsistent in regards to whether the association is moderated by sex.

Age. One longitudinal study, using a national sample of adolescents from the USA, examined whether the relationship between alcohol consumption as a predictor of depressive symptoms was moderated by age (Marmorstein, 2009). This study identified that high alcohol-use-related problems were a stronger predictor of depressive symptoms in early adolescence compared to late adolescence into early adulthood (Marmorstein, 2009). This effect was strongest among females, as high alcohol-use-related problems among males in
early adolescence was not associated with a greater increase in depressive symptoms, compared to low alcohol-use problems. Preliminary longitudinal evidence suggests the association with heavier drinking patterns and depressive symptoms may be stronger in early adolescence; however, further research is needed, including with normative drinking patterns.

**Non-linear.** Non-linear associations were examined in a longitudinal USA study of adolescents followed from mid- to late adolescence (Owens et al., 2008). While more frequent drinking occasions were associated with an increase in depressive affect over time, the temporal association followed a curvilinear pattern. Adolescents who consumed alcohol less often at baseline reported slower increases in depressive affect with increasing age compared to adolescents who consumed alcohol more frequently at baseline. However, increases in depressive affect among low-level drinkers at baseline was not even, with increases in depressive affect becoming increasingly larger over time. This effect was significantly stronger for females than males. However, this study did not control for other risk factors that may confound the association between alcohol consumption and depressive symptoms. Therefore, it cannot be ruled out that increases in depressive symptoms are not due to other variables.

**Summary of Findings**

The cross-sectional evidence consistently suggested that alcohol consumption is associated with higher levels of psychological distress and depressive symptoms. Results regarding whether biological sex moderates the association were highly inconsistent. Preliminary cross-sectional evidence suggested that younger drinkers were at greater risk for increasing depressive symptoms relative to older adolescents. This evidence base, however, does not provide support for the reverse hypothesis due to the studies’ cross-sectional design, which precludes conclusions about the temporal nature of the association.
Six of the nine longitudinal studies provided support for the reverse hypothesis. Results suggested that normative and heavy drinking patterns are associated with an increased risk for depressive symptoms. Preliminary evidence from one longitudinal study, suggests that alcohol-use-related problems are a stronger predictor of depressive symptoms in mid-adolescence compared to later adolescence and early adulthood. However, further studies are needed to examine this effect, particularly with lower and more prevalent patterns of alcohol consumption.

The evidence base was inconsistent regarding whether the association differs between males and females. These inconsistencies may be due to differences in participants’ ages across studies; such as, different developmental periods have been examined. As the prevalence of alcohol consumption and depressive symptoms increases across adolescence, any mediating effects by sex may change at different ages. The measurement of alcohol consumption also varies widely across studies and the mediating effects of sex should be considered across different drinking patterns (i.e. normative drinking vs heavy drinking). Differences in results across studies may also be due to failing to examine non-linear patterns, should the association between alcohol consumption and depression be non-linear.

Overall, the current review indicated that further studies are needed to more deeply examine the association between alcohol consumption as a predictor of depressive symptoms, particularly at lower levels of consumption. This is important because if normative drinking behaviour is a risk factor for adolescent depression, this carries important clinical implications for prevention (Rose, 2001). Chapter 6 will examine cross-sectional linear and non-linear associations between non-clinical levels of alcohol consumption as a predictor of psychological distress. Chapter 7 will examine temporal linear and non-linear associations between non-clinical levels of alcohol consumption as a predictor of depressive symptoms. Both studies will also examine whether age and sex moderate this association.
Chapter 5: Method

Chapter Overview

The main objective of this chapter is to provide an overview of the methodology used in the two empirical studies reported in this thesis. This chapter also describes the overall design and analytical approach of the two studies. Study 1 used a cross-sectional design of secondary school students. Study 2 used a longitudinal design with two waves of data collected annually and three cohorts: young, middle and oldest. At baseline, the youngest cohort was in Grade 5, the middle cohort in Year 7 and the oldest cohort in Year 10.

Aims of Empirical Studies

The main objective of both studies was to examine the relationship between non-clinical levels of alcohol consumption and depressive symptoms in Australian adolescents. Specifically, the primary aims of this thesis were to examine linear and non-linear effects, and to investigate whether age and gender moderated the association. Table 10 provides an overview of the key methodological information for each study.
Table 10

Summary of the Major Design Features of Study 1 and Study 2

<table>
<thead>
<tr>
<th></th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design</strong></td>
<td>Cross-sectional</td>
<td>Longitudinal</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>10,165</td>
<td>2,835</td>
</tr>
<tr>
<td><strong>Independent variable (IV)</strong></td>
<td>Psychological distress</td>
<td>Depressive symptoms (Time 2)</td>
</tr>
<tr>
<td><strong>Dependent variable (DV)</strong></td>
<td>Past 30 days alcohol consumption</td>
<td>Past 30 days alcohol consumption (Time 1)</td>
</tr>
<tr>
<td><strong>Sampling procedures</strong></td>
<td>Two-stage cluster sampling</td>
<td>Two-stage cluster sampling</td>
</tr>
<tr>
<td><strong>Analytical procedures</strong></td>
<td>Multilevel modelling</td>
<td>Multilevel modelling</td>
</tr>
</tbody>
</table>

**Study 1**

Study 1 examined whether the mean psychological distress scores were significantly higher among participants who had recently consumed alcohol compared to recent non-drinkers in a large representative sample of adolescents from Victoria, Australia ($N = 10,165$). It also investigated whether the cross-sectional association between non-clinical levels of alcohol consumption and psychological distress was moderated by age and biological sex, and examined non-linear effects in the association.

**Design.** Study 1 used cross-sectional data for secondary analysis from the Victorian Adolescent Health and Wellbeing Survey, colloquially referred to as the HowRU study, collected in 2009.

**Overview of measures.** The questionnaire was developed under the guidance of a steering committee. The questionnaire was designed to measure the health and wellbeing
status of adolescents and key predictors associated with health outcomes (see Appendix B for the full survey instrument). Validated scales were selected when available. When more than one validated scale was identified as suitable, the shorter scale was selected to reduce burden on participants. Details of the measures in this chapter are kept brief to avoid repetition of information that will be discussed in detail in Chapter 5, which presents Study 1.

**Dependent variable.** Mental health was assessed using the Kessler 10 (K10) which is a 10-item screening tool that assesses the presence of non-specific psychological distress through measuring the respondent’s experience of depressive and anxiety symptoms over the past 30 days (Kessler et al., 2002).

**Independent variable.** Recent alcohol consumption was measured over the past 30 days, a timeframe that has been used in previous studies (Balogun et al., 2013; Poulin et al., 2004). Alcohol consumption was measured by asking participants, "In the past 30 days have you ever had more than just a few sips of an alcoholic beverage (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezers or UDLs)?" This question was based on similar questions asked in previous national alcohol studies (Johnson, O'Malley, Bachman, & Schulenberg, 2011; White & Bariola, 2012). One-item measures have been demonstrated to be a reliable and valid instrument for assessing adolescent alcohol consumption (Dollinger & Malmguist, 2009; Koning, Harakeh, Engels, & Vollebergh, 2010).

**Covariates.** The selection of covariates was based on past research, which were reviewed in Chapter 3. Risk factors included in Study 1 were organised into individual, family and community domains. Table 11 provides a short definition of each risk factor included in Study 1 and an example survey question used to calculate the factor. A more detailed description of each measure is provided in Chapter 6, which presents Study 1.
## Table 11

*Summary of the Risk Factors included in Study 1*

<table>
<thead>
<tr>
<th>Domain</th>
<th>Risk or protective factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Females are at higher risk for mental health problems (Twenge &amp; Nolen-Hoeksema, 2002).</td>
<td><em>Are you? Male or Female</em></td>
</tr>
<tr>
<td>Age</td>
<td>Drinking at a younger age is associated with an increased risk of heavy drinking in later years (Hingson et al., 2006). Older adolescents are at higher risk for mental health problems (Fergusson &amp; Horwood, 2001).</td>
<td><em>How old are you?</em></td>
</tr>
<tr>
<td>Puberty</td>
<td>Early-onset puberty has been associated with an increased risk of mental health problems in girls and later puberty in boys (Petersen, Crockett, Richards, &amp; Boxer, 1998).</td>
<td><em>Example question: “Have you noticed any skin changes, especially pimples?”</em></td>
</tr>
<tr>
<td>Cigarette use</td>
<td>Adolescents who smoke cigarettes are at greater risk for mental health problems (Cairns et al., 2014).</td>
<td><em>Example question: “In the past 30 days have you ever smoked cigarettes?”</em></td>
</tr>
<tr>
<td>Marijuana use</td>
<td>Adolescents who engage in marijuana use are at greater risk for mental health problems (Cairns et al., 2014).</td>
<td><em>Example question: “In the past 30 days have you ever used marijuana/cannabis (pot, weed, grass)?”</em></td>
</tr>
<tr>
<td>Self-reported overweight status</td>
<td>Self-perception as overweight is associated with increased risk for mental health problems (Al Mamum et al., 2007).</td>
<td></td>
</tr>
</tbody>
</table>
Table 11 (cont.)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Risk or protective factor</th>
<th>Description</th>
<th>Example question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td>Family conflict</td>
<td>Adolescents raised in families high in conflict are at higher risk for mental health problems (Hawkins, Catalano, Kosterman, Abbott, &amp; Hill, 1999).</td>
<td>&quot;People in my family have serious arguments.&quot;</td>
</tr>
<tr>
<td></td>
<td>Poor family management</td>
<td>Families that have inconsistent rules, poor parental monitoring and unclear rules about alcohol/drugs are at higher risk for mental health problems (Hawkins et al., 1999).</td>
<td>&quot;My parents would know if I didn't come home on time.&quot;</td>
</tr>
<tr>
<td></td>
<td>Family attachment</td>
<td>Adolescents with poorer attachment to parents are at greater risk for mental health problems (Hawkins et al., 1999).</td>
<td>&quot;Do you feel close to your mother?&quot;</td>
</tr>
<tr>
<td>School</td>
<td>Bullying victimisation</td>
<td>Adolescents who are bullied are at greater risk for mental health problems (Bond, Wolfe, Tollit, Butler, &amp; Patton, 2007).</td>
<td>&quot;Has anyone teased you or called you names recently?&quot;</td>
</tr>
<tr>
<td></td>
<td>Academic failure</td>
<td>Adolescents who perform poorly in school are at greater risk for mental health problems (Bond, Thomas, Toubourou, Patton, &amp; Catalano, 2000).</td>
<td>&quot;Putting them all together, what were your marks like last year?&quot;</td>
</tr>
</tbody>
</table>
### Table 11 (cont.)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Risk or protective factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer connectedness</td>
<td>Adolescents who feel isolated and disconnected from their peers are at greater risk for mental health problems (Deci &amp; Ryan, 2000).</td>
<td><em>Example question: “I consider the people I regularly interact with to be my friends?”</em></td>
</tr>
<tr>
<td>Community</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community disorganisation</td>
<td>Neighbourhoods with physical deterioration, violence and drug use are associated with adverse outcomes for adolescents (Hawkins et al., 1999).</td>
<td><em>Example question: “Lots of empty or abandoned buildings.”</em></td>
</tr>
<tr>
<td>Low neighbourhood attachment</td>
<td>Neighbourhoods where residents report low-level of bonding to their community are associated with adverse outcomes for adolescents (Hawkins et al., 1999).</td>
<td><em>Example question: “I'd like to get out of my neighbourhood.”</em></td>
</tr>
</tbody>
</table>

### Study 2

Study 2 aimed to examine the temporal association between non-clinical levels of alcohol consumption and depressive symptoms in a sample of adolescents from Victoria, Australia ($N = 2,835$). It investigated whether non-clinical levels of alcohol consumption were a significant predictor of depressive symptoms after controlling for a range of potential other risk factors. It examined whether age and gender moderated the association. It also examined whether the association between alcohol consumption and depressive symptoms
was non-linear. A non-linear form of the alcohol consumption variable was generated, which will be explained in detail in Study 2.

**Design.** This study used data for secondary analysis from the International Youth Development Study (IYDS). The IYDS is a cross-national longitudinal investigation of adolescent behaviours and health outcomes in representative samples in Victoria, Australia; Washington State, USA; and Mumbai, India (McMorris, Hemphill, Toumbourou, Catalano, & Patton, 2007). The sample comprises three cohorts: youngest, middle and oldest. At baseline, the mean age of each cohort was 11 years, 11 months (youngest): 13 years, 11 months (middle); and 15 years, 10 months (oldest). This study analysed data from the first two waves (years 2002 and 2003) of the Australian cohort from the IYDS.

**Overview of measures.** The IYDS questionnaire is a self-report survey instrument which assesses risk and protective factors, and a variety of health behaviours (i.e. alcohol and drug use, antisocial behaviour and mental health) associated with adolescent health outcomes (Glaser, Van Horn, Arthur, Hawkins, & Catalano, 2005). The scales used in the instrument have been assessed to have good reliability and construct validity in US (Glaser et al., 2005) and Australian (Bond, Thomas, Toumbourou, & Patton, 1998) school samples (see Appendix E for a copy of the full survey instrument).

**Dependent variable.** At Time 1 and Time 2, mental health was assessed using the Short Mood and Feelings Questionnaire (SMFQ) which is a brief depression inventory for children and adolescents (Angold et al., 1995; Messer et al., 1995). The SMFQ is a widely-used measure (Katon, Russo, Richardson, McCauley, & Lozano, 2008; Patton et al., 2008) and was designed for use in child and adolescent epidemiological studies (Angold et al., 1995).
**Independent/predictor variable.** For the middle and oldest cohort, the measurement of alcohol consumption was the same as Study 1. For developmental reasons, however, lifetime alcohol consumption was used in the youngest cohort.

**Covariates.** As in Study 1, the selection of covariates was based on a review of literature presented in Chapter 3. Most of the covariates included in this study were the same as in Study 1. However, there were some differences. Study 2 included a measure of low self-esteem that was not available in Study 1. Study 2 did not include a measure of perception of weight and peer connectedness as the survey instrument had not assessed for these factors. Table 12 provides a short definition of each risk factor included in Study 2 and an example survey question used to calculate the factor. To reduce repetitiveness, different sample items were described for the same variables included in Study 1. A more detailed description of each measure is provided in Chapter 7, which presents Study 2.
Table 12

*Summary of the Risk Factors included in Study 2*

<table>
<thead>
<tr>
<th>Domain</th>
<th>Risk Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Sex</td>
<td>Females are at higher risk for mental health problems (Twenge &amp; Nolen-Hoeksema, 2002).</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>Older adolescents are at higher risk for mental health problems (Fergusson &amp; Horwood, 2001).</td>
</tr>
<tr>
<td></td>
<td>Pubertal stage</td>
<td>Obesity and overweight are associated with increased risk for mental health problems (Petersen et al., 1998).</td>
</tr>
<tr>
<td></td>
<td>Cigarette use</td>
<td>Adolescents who smoke cigarettes are at greater risk for mental health problems (Cairns et al., 2014).</td>
</tr>
<tr>
<td></td>
<td>Marijuana use</td>
<td>Adolescents who engage in marijuana use are at greater risk of depression (Cairns et al., 2014).</td>
</tr>
<tr>
<td></td>
<td>Self-esteem</td>
<td>Adolescents with low self-esteem are at greater risk for mental health problems (Rosenberg, 1965).</td>
</tr>
<tr>
<td>Family</td>
<td>Family attachment</td>
<td>Adolescents with poorer attachment to parents are at greater risk for mental health problems (Hawkins et al., 1999).</td>
</tr>
</tbody>
</table>
Table 12 (cont.)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Risk Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor family management</td>
<td>Families that have inconsistent rules, poor parental monitoring and unclear rules about alcohol/drugs are at higher risk for mental health problems (Hawkins et al., 1999).</td>
<td><em>Sample item: “Do you feel very close to your father?”</em></td>
</tr>
<tr>
<td>Family conflict</td>
<td>Adolescents raised in families high in conflict are at higher risk for mental health problems (Hawkins et al., 1999).</td>
<td><em>Sample item: “The rules in my family are clear.”</em></td>
</tr>
<tr>
<td>School</td>
<td>Bullying victimisation</td>
<td>Adolescents who are bullied are at greater risk for mental health problems (Bond et al., 2007).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Sample item: “Have you been bullied recently (teased or called names, had rumours spread about you, been deliberately left out of things, threatened physically or actually hurt)”</em></td>
</tr>
<tr>
<td></td>
<td>Academic failure</td>
<td>Adolescents who perform poorly in school are at greater risk for mental health problems (Bond et al., 2000).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Sample item: “Are your school grades better than the grades/marks of most students in your class?”</em></td>
</tr>
<tr>
<td>Community</td>
<td>Community disorganisation</td>
<td>Neighbourhoods with physical deterioration, violence and drug use are associated with adverse outcomes for adolescents (Hawkins et al., 1999).</td>
</tr>
</tbody>
</table>
Table 12 (cont.)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Risk Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low neighbourhood attachment</td>
<td>Neighbourhoods where residents report low-levels of bonding to their community are associated with adverse outcomes for adolescents (Hawkins et al., 1999).</td>
<td><em>Sample items: “Lots of graffiti.”</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Sample items: “Lots of crime and/or drug selling.”</em></td>
</tr>
</tbody>
</table>

Analytical Method for Empirical Studies

In both studies, multilevel modelling (MLM) was used to analyse the data. MLM is a type of regression analysis (Finch, Bolin, & Kelley, 2014). Regression techniques are statistical tools used for studying linear relationships between two or more variables and can also be used to estimate the effect of the predictor variable on the outcome variable (Finch et al., 2014). The two most common types of regression are simple linear regression and multiple regression. In simple linear regression, the aim is to understand the direction and strength of the relationship between two variables (Finch et al., 2014). In most cases, more than one variable predicts change in another variable.

The primary assumptions of traditional regression techniques assume that data are as follows (Finch et al., 2014; Tabachnick & Fidel, 2013):

1. The data is normally distributed;
2. There is a linear relationship between predictor and outcome variables; and
3. All individuals are independent from one another.

The assumption of independence means that an individual's response is unrelated to the responses of other individuals in the sample. This assumption is addressed by using
random sampling procedures to obtain a sample from the general population. However, random sampling is not always possible. In many cases it is addressed by employing cluster (stratified) sampling procedures. For example, in understanding the health status of different neighbourhoods or in multilevel health aetiology research, covariates at different levels are controlled (i.e. individual, family, school and neighbourhood).

The assumption of independence is violated when participants are selected from clusters (i.e. children in schools). For example, children who attend the same school are exposed to the same school-level influences such as teaching practices, school cohesiveness, school violence and level of support. Therefore, two responses from individuals who attend the same school tend to be more similar than two responses from different schools. Thus, observations within one cluster are not independent from other observations within the same cluster. Furthermore, observations from two individuals within the same neighbourhood tend to be more similar than two observations from different neighbourhoods due to shared neighbourhood-level influences. Using traditional regression techniques with clustered data increases the risk of incorrectly finding a significant effect (Type I error) (Bingenheimer & Raudenbush, 2004; Goldstein, 2011; Rabe-Hesketh & Skrondal, 2008).

MLM has many purposes; however, it is most commonly employed in observational and survey studies of multi-level health aetiology where the data may be clustered or have a hierarchical structure (Bingenheimer & Raudenbush, 2004; Goldstein, 2011; Rabe-Hesketh & Skrondal, 2008). The primary advantage of MLM is that it accounts for the different levels of influence and interactions between variables, thus providing a more accurate picture of the sources of variability in the data. Controlling for clustering leads to increased accuracy in results and greater statistical power (Bingenheimer & Raudenbush, 2004; Goldstein, 2011; Rabe-Hesketh & Skrondal, 2008).
In the current thesis, participants for the HowRU and the IYDS datasets were recruited through a two-stage cluster sampling approach. In the first stage, six schools were randomly selected from each LGA in the state of Victoria. In the second stage, three classrooms were randomly selected in each target year level of participating schools. This sampling produced clustered data, thus individuals were nested in classrooms that were nested in schools and embedded within LGAs (see Figure 3). Thus, the assumption of independence was violated. Cases collected from the same classroom, school and neighbourhood will be exposed to some of the same risk and protective factors at the family, school and community levels. In both studies, MLM analytical procedures were used to analyse the data and control for the effects of clustering. The specific analytical strategy employed is described in each study.
Figure 3. A diagram of the hierarchical structure in the data for both Study 1 and Study 2. In regards to level 4 of the hierarchy, three classrooms were selected from each target year level at each school; however, the year levels are not depicted in the figure.
Conclusion

This thesis comprises two empirical studies. Study 1 utilised cross-sectional data from the Victorian Adolescent Health and Wellbeing Survey. Study 2 builds on the first study by employing longitudinal data from the IYDS. Both datasets comprise large representative samples of adolescents from Victoria, Australia. A two-stage cluster sampling procedure was used to recruit participants for both studies. While this sampling procedure provides a representative sample of the Victorian adolescent population, it violates the assumption of independence as cases are related. Therefore, MLM analytical procedures will be used to analyses these data.
Chapter 6: Study 1

Alcohol Consumption and Psychological Distress: A Study in Australian Adolescents

Chapter Overview

This chapter presents Study 1. This study analyses cross-sectional data from the Victorian Adolescent Health and Wellbeing Survey to examine linear and non-linear associations in the relationship between non-clinical alcohol consumption as a predictor of psychological distress in a sample of Australian adolescents. First, this chapter reiterates the gaps in the extant literature before outlining the aims, research questions and hypotheses of this study. The subsequent sections present the methodology, results and discussion.

Aims, Research Questions and Hypotheses

As outlined in earlier chapters, existing literature suggests that the development of adolescent depression may be explained by employing ecological theories of human development that consider the role of risk and protective factors across multiple domains (Bronfenbrenner, 1979; Patel et al., 2007). Research has consistently identified a positive association between alcohol consumption and depression in adolescence (Arbour-Nicitopoulos et al., 2012; Balogun et al., 2013; Myklestad et al., 2012; Poulin et al., 2004; Salom et al., 2016; Verdurmen et al., 2005; Zinn-Souza et al., 2008) and adulthood (McBride et al., 2016; Merikangas et al., 1998; Swendsen & Merikangas, 2000). This finding suggests that as one problem emerges or increases, the other problem tends to do so. There has been a greater emphasis in the literature on examining the self-medication hypothesis (Crum et al., 2008; Edwards et al., 2014b; McCarty et al., 2012); thus, less is known about the reverse hypothesis. While the current evidence base provides support for the reverse hypothesis in adolescence (Boden & Fergusson, 2011; Cairns et al., 2014), much about this relationship remains unanswered.
As also identified in earlier chapters, the measurement of alcohol consumption across studies varies widely. While some studies examining the reverse hypothesis have explored normative drinking patterns (i.e. non-clinical levels) (Edwards et al., 2014a; Rodriguez et al., 2005; Salom et al., 2016; Yue et al., 2015) other studies have examined this association with depression with heavier drinking patterns in adolescence (Marmorstein, 2009; Myklestad et al., 2012; Skogen et al., 2014; Verdurmen et al., 2005; Zinn-Souza et al., 2008). The consumption of alcohol during adolescence is generally considered a normal part of adolescent development (Masten et al., 2009). However, heavier drinking patterns such as binge drinking and regular weekly alcohol consumption, which occur less frequently in adolescence are considered more deviant patterns of consumption. The association between alcohol consumption and depression in adolescents may differ between normative and heavy drinking patterns. The current thesis focuses on non-clinical normative patterns of alcohol consumption, which are more prevalent during adolescence. It is important to examine whether normative drinking behaviour is a risk factor for mental health problems, as such findings carry important clinical implications for prevention (Rose, 2001).

Using cross-sectional data from the Victorian Adolescent Health and Wellbeing Survey, Study 1 aimed to examine the association between alcohol consumption as a predictor of depressive symptoms in a sample of Australian adolescents. Specifically, it examined linear and non-linear associations between non-clinical alcohol consumption as a predictor of psychological distress, a construct closely related to depression. In the development of this study, three research questions were posed:

RQ1: Is the association between non-clinical levels of alcohol consumption as a predictor of psychological distress non-linear?
RQ2: Is the association between non-clinical levels of alcohol consumption as a predictor of psychological distress moderated by age?

RQ3: Is the association between non-clinical levels of alcohol consumption as a predictor of psychological distress moderated by biological sex?

In line with the existing theoretical and empirical literature, three hypotheses were developed based on past research. In cross-sectional studies, there is a well-established association between alcohol consumption and depressive symptoms, including psychological distress, in adolescence (Bazargan-Hejazi et al., 2010; Salom et al., 2016; Yue et al., 2015). Theoretically, it is argued that alcohol consumption may predispose adolescents to depressive symptoms via two pathways. This increased risk for depression in adolescence following alcohol consumption could be due to the biological effects of ethanol on the developing brain (Spear, 2002, 2004). Alternatively, alcohol consumption in adolescence may cause academic or social consequences that increase the risk of depression (Marmorstein, 2009). On the basis of this evidence, the following hypothesis was made:

H1: It was hypothesised that alcohol consumption would be a significant predictor of psychological distress after controlling for age, biological sex and other risk factors.

Previous studies in adult samples have identified a J-shaped and U-shaped relationship between alcohol consumption and depression, where abstainers and heavy drinkers are at a greatest risk for depression (Alati et al., 2005; Caldwell et al., 2002; Coelho et al., 2014; DeWit et al., 2000; Peele & Brodsky, 2000; Rodgers et al., 2000; Skogen et al., 2009). Emerging longitudinal evidence suggests the association between alcohol consumption and depression may follow a non-linear pattern over time (Owens et al., 2008). Preliminary results suggest a curvilinear pattern in adolescence, rather than the J- or U-shaped pattern identified in adulthood. The different pattern in the association between adults
and adolescents may be related to developmental differences. As adolescents are more sensitive to the effects of alcohol on memory and learning (Hiller-Strunhofel & Swartzwelder, 2005; Markwiese et al., 1998), and less sensitive to the sedative effects of alcohol that act as a cue to slow down drinking (Little et al., 1996; White & Swartzwelder, 2005), adolescents may be more susceptible to the adverse effects of alcohol on mental health. Differences in the timing of developmental changes, such as novelty seeking and self-regulation capacity may also contribute to non-linear developmental patterns (Spear, 2000; Steinberg, 2010). On the basis of this evidence, the following hypothesis was made:

H2: It was predicted that the shape of the association between non-clinical alcohol consumption and depressive symptoms would be non-linear.

Furthermore, existing empirical literature suggests that alcohol consumption as a predictor of depression may be moderated by age. Previous research has demonstrated a significant interaction between heavy non-normative patterns of alcohol consumption and depressive symptoms. Thus, younger adolescents were more susceptible to the effects of heavy consumption on mental health than older adolescents were (Poulin et al., 2004; Marmorstein, 2009; Verdurmen et al., 2005). Less is known about whether age moderates the association between normative patterns of alcohol consumption and depression in adolescents. As younger adolescents are more sensitive to the adverse effects of alcohol consumption (Brown & Tapert, 2004), the following hypothesis was made:

H3: It was hypothesised that there would be a significant interaction between age and alcohol consumption. Specifically, it was predicted that alcohol consumption would be a stronger predictor of psychological distress in younger adolescents compared to older adolescents.
As identified in Chapter 4, the current evidence base is inconsistent in regards to whether biological sex moderates the association in adolescents. Therefore, no hypothesis regarding sex differences was made. Differences across sexes in the association between alcohol consumption as a predictor of psychological distress was examined from an exploratory perspective.

Method

Participants

A two-stage cluster sampling approach was used for the recruitment of schools and students from the state of Victoria, Australia. Special schools were excluded, yielding 740 eligible government, independent and Catholic secondary schools. Overall, 357 schools were approached and a final sample of 190 schools (53%) agreed to participate. The proportion of government (59%), Catholic (21%) and private schools (20%) in the study sample were similar to the percentages of schools in the state, although private schools were overrepresented in the study sample.

A total of 13,501 students were eligible to participate from across 190 schools. Of eligible participants, the overall response rate was 77%. Reasons for non-participation were parents refusing (5.5%), students refusing (0.3%), and students absent (15%). A slightly higher number of metropolitan students (78%) completed the survey compared to students from non-metropolitan schools (73%). Also, a slightly higher number of metropolitan parents refused consent (5.7%) compared to non-metropolitan parents (4.4%). There was no difference in students’ refusals and absences on the day of survey across metropolitan and non-metropolitan areas.

A total of 10,424 participants completed the questionnaire. Of these participants, 151 were excluded for responding dishonestly (further explained on page 147). A further 108
were excluded from the current study as they were 18 years or older, and are able to legally purchase alcohol in Australia. The current study comprised a final sample of 10,165 students (49% male) aged between 11 and 17 years ($M = 14.4$, $SD = 1.64$).

**Measures**

The Victorian Adolescent Health and Wellbeing Survey was developed by the Department of Education and Early Childhood Development (DEECD). The survey is a comprehensive self-report secondary school questionnaire designed to measure key adolescent health and wellbeing indicators. Whenever possible, validated measures were selected. The survey also included a measure of honesty to ensure data accuracy. The variables from the questionnaire that were included in the current study are described below (see Appendix B for the full survey instrument).

**Dependent variable.** Psychological distress was assessed by the Kessler 10 (K10), which is a 10-item screening tool that assesses the presence of non-specific psychological distress over the past 30 days (Kessler et al., 2002). The K10 is a widely used measure in Australian (Australian Bureau of Statistics., 2009) and international (Kessler et al., 2010) epidemiological studies. It has demonstrated reliability in adolescent (Green et al., 2010) and adult (Kessler et al., 2002; Kessler et al., 2010) samples. In a US adolescent sample ($N = 6483$), the 6-item version (includes 6 of the 10 items on the K10) demonstrated good predictive ability for internalising disorders (AUC = 0.80) (Green et al., 2010). The predictive ability of the K10 for depressive symptoms in adolescent sample ($N = 2352$) from Hong Kong was higher (AUC = 0.90) (Chan & Fung, 2013). The measure also has good internal consistency in adolescent samples (Cronbach’s $\alpha = 0.78$) (Green et al., 2010). In Australian health care settings, the K10 is widely used as a screening measure for mental disorders (Australian Government Department of Health and Ageing, 2011; Coombs, 2005). In the current study, internal consistency for on the K10 was high (Cronbach’s $\alpha = .90$).
Responses on the K10 were reported on a 5-point scale ranging from ‘none of the time’ to ‘all of the time’. Standard scoring procedures were used (Coombs, 2005; Cvetkovski, Reavley, & Jorm, 2012). Total scores ranged from 10 to 50 with higher scores indicating greater severity. Total K10 scores can be dichotomously (no psychological, psychological distress) or categorically (low, moderate, high, very high) classified. Common categorical scoring classifies individuals who obtain scores between 10-19 as likely to be well (no psychological distress), 20-24 as likely to have a mild mental disorder (mild), 25-29 as likely to have a moderate mental disorder (moderate) and 30-50 as likely to have a severe mental disorder (high) (Coombs, 2005).

In the current study, psychological distress is dichotomous with a score of zero for K10 total scores ranging from 10 to 29 and a score of one to indicate K10 total scores of 30 and greater. A score of one identified participants who were experiencing high levels of psychological distress and likely to meet criteria for at least one mental disorder. While in adult samples the dichotomous cut-off score is generally lower, previous adolescent studies used a higher cut-off score (≥ 31) as adolescents' mood tends to be more labile than adults (Huang et al., 2009). This cut-off score is also supported by findings that identified that 75% of individuals who scored 30.5 or more on the K10 met criteria for a depressive or anxiety disorder (Andrews & Slade, 2001).

**Independent variable: Recent alcohol consumption.** Recent alcohol consumption was measured over the past 30 days. Participants were asked, "In the past 30 days have you ever had more than just a few sips of an alcoholic beverage (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezers or UDLs)?" Responses were indicated on a five-point scale ranging from ‘never’ to ‘10+ times.’ Alcohol consumption is dichotomous with a score of zero for ‘never’, and a score of one for ‘1 or 2 times’ to ‘10+ times’ categories. This question was based on similar questions asked in previous national and state-wide alcohol...
studies (Johnson et al., 2011; Toumbourou et al., 2009; White & Bariola, 2012). One-item measures have been demonstrated to be a reliable and valid instrument for assessing adolescent alcohol consumption (Dollinger & Malmguist, 2009; Koning et al., 2010). This measure has also been used in previous studies examining the association between alcohol consumption and psychological distress, and alcohol consumption and depression (Balogun et al., 2013; Owens et al., 2008; Poulin et al., 2004; Salom et al., 2016).

**Covariates.** The selection of covariates was based on the findings from the literature review presented in Chapter 3. When the data was available, risk factors identified in Chapter 3 were included in this study to control for factor that may confound the association between alcohol consumption and psychological distress in adolescents.

**Individual-level.** Individual-level covariates were sex, age, pubertal stage, perception of self as overweight, cigarette use and marijuana use.

*Sex and age.* Participants were asked to provide information regarding their biological sex and age in years. Sex is dichotomous with a score of zero for males and one for females. Age is a continuous variable.

*Pubertal stage.* Pubertal development was assessed using the Self-Rating Scale for Pubertal Development (student version) which indicates participants’ current stage of pubertal development: pre-pubertal, early pubertal, mid-pubertal, late pubertal and post-pubertal (Carskadon & Acebo, 1993; Petersen et al., 1998). Participants were asked a total of five questions including two sex specific items (see Appendix C for gender specific questions). For example, participants were asked, “Have you noticed any skin changes, especially pimples?” Responses were indicated on a four-point scale ranging from ‘has not yet started’ to ‘seems complete’. Higher scores indicated that the participant was in a later stage of pubertal development.
The Self-Rating Scale for Pubertal Development has been validated in two samples of young adolescents (N = 698, N = 253) who completed the questionnaire bi-annually over three years (Carskadon & Acebo, 1993; Petersen et al., 1998). In these studies, the measure demonstrated acceptable internal consistency with Cronbach’s alpha coefficient ranging from .67 to .83. In a small pre-test sample (N = 38), there was a high correlation between the samples self-rating scores and the paediatrician-rated physical development (r = .84-.87). The test-retest reliability was not reported. This measure has been used in previous studies examining the effect of pubertal developmental stage on adolescent health and social behavioural outcomes (Hayward, Killen, Wilson, & Hammer, 1997; Patton et al., 2008). In the current study, there was high internal consistency among items on the Self-Rating Scale for Pubertal Developmental for both males (Cronbach’s α = .81) and females (Cronbach’s α = .76).

**Body weight perception.** Body weight perception was assessed using self-reported perception of weight obtained from a single item that asked participants, “How do you feel about your weight at the moment? Are you...” Responses were indicated on a five-point scale ranging from ‘very underweight’ to ‘very overweight.’ Perception of weight is dichotomous with a score of zero for ‘very underweight’ to ‘somewhat overweight,’ and a score of one for the ‘very overweight’ category. Previous studies have used a similar one item with Likert scale responses to assess body weight perception (Al Mamun et al., 2007; ter Bogt et al., 2006).

**Cigarette and marijuana use.** Participants were asked, "In the past 30 days have you ever smoked cigarettes?" and "In the past 30 days have you ever used marijuana/cannabis (pot, weed, grass)?” For both items, responses were reported on a five-point scale ranging from 1 (never) to 5 (10 or more times). Responses were combined to create a dichotomous measure of recent cigarette and marijuana use (0 = no, 1 = yes). Previous national and state-
wide epidemiological studies have used a similar one item to assess cigarette and marijuana use (Johnson et al., 2011; Toumbourou et al., 2009; White & Bariola, 2012).

**Family-level.** Family-level covariates were family attachment, family conflict and poor family management.

*Family conflict* was assessed using a three-item scale from the Seattle Social Development Project (SSDP), Family Skills Scale (Hawkins et al., 1999). Items asked participants about their family in regards to conflict and arguments. For example, one item stated: “We argue about the same things in my family over and over”. For all items, response options were 1 ‘YES!’’, 2 ‘yes’, 3 ‘no’, and 4 ‘NO!’’. Responses were reverse scored and the mean score of the three items was calculated to create one continuous variable that ranged from one to four, with higher scores indicating higher levels of family conflict. The current study found good internal consistency for this scale, with a Cronbach’s alpha of .80.

*Poor family management* was assessed using a six-item scale from the SSDP, Family Skills Scale (Hawkins et al., 1999). The six items asked about family rules and parental monitoring, for example one item stated: “When I am not at home, one of my parents knows where I am and who I am with.” Response options were 1 ‘YES!’’, 2 ‘yes’, 3 ‘no’, and 4 ‘NO!’’. The mean of the six items was calculated to create one continuous variable that ranged from one to four, with higher scores indicating poorer family management. The current study found good internal consistency for this scale, with a Cronbach’s alpha of .78.

*Family attachment* was assessed using a six-item scale from the SSDP, Family Skills Scale (Hawkins et al., 1999). Two items asked participants about closeness to their mother and two items about closeness to their father. For example, one item asked “Do you feel close to your mother?” Response options were 1 ‘YES!’’, 2 ‘yes’, 3 ‘no’, and 4 ‘NO!’’. Responses were reverse scored and the mean of the six items was calculated to create one continuous
variable that ranged from one to four, with higher scores indicating greater family attachment. The current study found a good internal consistency for this scale, with a Cronbach’s alpha of .84.

**School-level.** School-level covariates were bullying victimisation, academic failure and peer connectedness.

*Bullying victimisation* was assessed using the Gatehouse Bullying Scale (GBS) which comprises 12 items that assesses 4 types (3 items each) of bullying: teasing/name calling, rumours, deliberately left out, and physically threatened/hurt (Bond et al., 2007). There are three items in each of the four scales, which assess whether the individual has experienced that type of bullying recently (i.e. “Has anyone teased you or called you names recently?”), how often (i.e. “How often?”) and how upsetting it was for them (i.e. “How upsetting was it when you were teased?”). Responses were reported on a two-point scale for the first item in each scale (0 = no, 1 = yes), a three-point scale for the second item (1 = most days, 2 = about once a week, 3 = less than once a week) and a three-point scale for the third item (1 = not at all, 2 = a bit, 3 = I was quite upset). Standardised scoring procedures were followed, which recommends using the mean score to identify a total score that ranges from zero (not bullied) to three (bullied frequently and upset). A dichotomous measure of bullying victimisation was derived from the total scores: scores of zero (0 = not bullied) and one (1 = bullied).

The GBS was validated in a sample of Australian adolescents from the state of Victoria (N = 2463) (Bond et al., 2007). Concurrent validity was assessed against the widely-used Peer Relations Questionnaire. Agreement between the two measures across the four scales ranged from 75% to 90%. Test-retest reliability was moderate with Kappa’s ranging from 0.36 to 0.63 across the four scales. The current study found good internal consistency across the four scales, with Cronbach’s alphas ranging from .74 to .88.
*Academic failure* was assessed using a two-item scale from the Communities That Care Youth Survey (Bond et al., 2000). Participants were asked, “*Putting them all together, what were your marks like last year?*” Responses options were 1 ‘very good’, 2 ‘good’, 3 ‘average’, 4 ‘poor’, 5 ‘very poor.’ Participants were also asked, “*Are your school marks better than the marks of most students in your class?*” Response options were 1 ‘YES!’, 2 ‘yes’, 3 ‘no’, and 4 ‘NO!’ The mean score of the two items was calculated to create one continuous variable that ranged from one to four, with higher scores indicating poorer academic performance. The current study found adequate internal consistency for this scale, with a Cronbach’s alpha of .68.

*Peer connectedness was assessed* using the 3-item subscale, relatedness, from the Basic Psychological Needs Scale (Deci & Ryan, 2000). Participants were asked about how they got along with others and how connected they felt to others. For example, participants were asked, “*I consider the people I regularly interact with to be my friends.*” Responses were reported on a seven-point scale ranging from 1 ‘not at all true’ to 7 ‘very true’. A dichotomous measure was derived from the total scores. Peer connectedness was coded as a dichotomous variable; scores of zero indicated low connectedness (scores ≤ 4) and scores of one indicated high connectedness (scores > 4). The current study found good internal consistency for this scale, with a Cronbach’s alpha of .80.

*Community-level.* Community-level covariates were community disorganisation and low neighbourhood attachment.

*Community disorganisation* was assessed using the five-item scale from the SSDP, Neighbourhood Disorganisation Scale (Hawkins et al., 1999). The five items asked participants about their neighbourhood in regards to abandoned buildings, graffiti, fights, crime and safety. For example, one item asked participants to rate the statement “*In my
neighbourhood there is crime and/or drug selling.” Response options were 1 ‘YES!’, 2 ‘yes’, 3 ‘no’, and 4 ‘NO!’ Responses were reverse scored and the mean of the five items was calculated to create one continuous variable that ranged from one to four, with higher scores indicating higher levels of community disorganisation. The current study found good internal consistency for this scale, with a Cronbach’s alpha of .79.

Low neighbourhood attachment was assessed using a three-item scale from the SSDP, Neighbourhood Disorganisation Scale (Hawkins et al., 1999). The three items asked participants about their connection to their neighbourhood. For example, one item asked participants to rate the statement “I’d like to get out of my neighbourhood.” Response options were 1 ‘YES!’, 2 ‘yes’, 3 ‘no’, and 4 ‘NO!’ Responses were reverse scored and the mean of the five items was calculated to create one continuous variable that ranged from one to four, with higher scores indicating lower levels of neighbourhood attachment. The current study found good internal consistency for this scale, with a Cronbach’s alpha of .76.

Honesty scale. The questionnaire included an honesty scale, which comprised one validity item repeated twice (on different pages). This scale was designed to identify participants responding dishonestly or checking random responses. Participants were asked whether they had ever taken a fictitious drug named ‘phenoxidine.’ If respondents answered ‘yes’ to this question they were removed from the analysis.

Procedure

The research was commissioned by the DEECD of the Victorian Government who appointed a steering committee to develop the questionnaire (DEECD, 2009). The Centre for Adolescent Health, at the Royal Children’s Hospital was commissioned to conduct the survey on behalf of the DEECD. Prior to commencing the project, ethics approval was obtained from the Royal Children's Hospital Ethics in Human Research Committee. Permission was also
sought from the Royal Children’s Hospital to conduct secondary data analysis to address the research aims outlined in this thesis. Permission to conduct research in schools was also sought from the DEECD Research Office, the Victorian Catholic Education Office and directly from private schools.

As mentioned above, a two-stage clustering sample approach was used to recruit schools and students. In the first stage, schools were randomly selected using the probability proportionate to grade-level size-sampling procedure (Kish, 1965). Six schools were randomly selected within each metropolitan local government area (LGA) and seven schools within each non-metropolitan education region. The use of different divisions (LGA and education region) for recruiting metropolitan and non-metropolitan schools was due to lower population density in non-metropolitan regions. When a school declined to participate, a school in the same region was randomly selected to replace the non-participating school.

In the second stage, one classroom was randomly selected from each of the three identified year levels (Years 7, 9 and 11) within each participating school to obtain a sample across the adolescence period. Written information was sent to the randomly selected students and their parents. The ethics committees allowed passive consent procedures for parental approval as this study was deemed 'low-risk'. The Catholic Education Office permitted passive consent on the condition that all questions relating to sexual activity were removed. Students were given the option to choose not to participate on the day of data collection.

The delivery of questionnaires was coordinated by the Centre of Adolescent Health, Royal Children’s Hospital. In 2009, the questionnaires were administered electronically when possible, and in students’ usual classroom settings. Each participant was assigned a unique numeric login that was not linked to their name to ensure anonymity. Paper copies of the
questionnaire were available on the day in case computer or internet connection were unavailable. In total, 1,978 (19%) paper questionnaires were completed. The questionnaires took approximately one hour to complete.

**Analytical Strategy**

All analyses were conducted in STATA 11.0 (StataCorp LP, College Station, TX). Prior to conducting the main analyses, a series of data cleaning processes were undertaken to reduce measurement error and ensure the underlying assumptions of the MLM statistical technique were met. Descriptive statistics were computed with 95% confidence intervals. T-tests were also performed to assess for significant differences in psychological distress scores and alcohol consumption between sexes and at different ages.

The intra-class correlation (ICC) was calculated to test the assumption of independence. The ICC is a measure of the correlation between observations in a cluster (Goldstein, 2011; Hayes, 2006; West, Welch, & Galecki, 2007). The ICC indicates whether responses in a cluster are independent of each other. In the current study, the ICC indicated that the within-group (school) homogeneity for the dependent variable (K10 scores) was 0.01 (95CI: .00-.03) and was significant at the .05 level. A significant ICC suggests that statistical techniques that adjust for clustered data should be undertaken (Hayes, 2006).

To examine non-linear associations a quadratic alcohol use variable was created for inclusion in the model building process (Goldstein, 2011). This was created to model a possible J- or U-shaped association. The continuous form of the alcohol consumption variable (1 = never, 2 = 1 to 2 times, 3 = 3 to 5 times, 4 = 6 to 9 times, and 5 = 10+ times) was re-coded. To create the quadratic variable, alcohol consumption was squared. The new values were 2 (never), 4 (1 to 2 times), 9 (3 to 5 times), 16 (6 to 9 times) and 25 (10+ times). When examining non-linear associations with psychological distress, both alcohol
consumption and alcohol consumption squared were included in the model building process simultaneously.

To test the hypotheses, a multilevel logistic regression with psychological distress (0 = K10 scores 0 – 30; 1 = K10 scores 31 – 50) as the dependent variable was developed. A binary dependent variable was selected as the current study focused on examining the presence or absence of psychological distress between drinkers and non-drinkers, rather than examining this association at different levels of psychological distress. In addition, binary variables are easier to interpret. The multilevel logistic regression modelled individuals (N = 10, 165) nested within schools, with random effects estimation specified for the school-level (N = 190 schools). An overall model was built by adding variables, beginning with the most proximal (individual-level) and finishing with the most distal (community-level) (Goldstein, 2011). Missing data was imputed. However, as the Log likelihood, Akaike information criterion (AIC) and Bayesian information criterion (BIC) are not produced with multiple imputed data, model improvement was examined according to whether the variables added to the model were a significant predictor of psychological distress, at the .05 level. Non-significant predictors were removed throughout the model building process.

During the model building process, two models were constructed using the same analytical procedure. One model examined linear associations between alcohol consumption and psychological distress. The second model examined non-linear associations between these two variables. The best fitting model was reported in the results section.

The models were built in four stages. In the first stage, a null model with only a random intercept (varying by school) was produced. The null model provided a baseline comparison of the school variance in predicting psychological distress allowing estimation of the contribution of variables hierarchically added in subsequent models to reduce school
variance (Goldstein, 2011; Hayes, 2006). In the second stage, individual-level variables (including school-level) were entered into the model and non-significant predictors were removed. School-level variables were entered at the individual-level, as these variables were a measure of each participant’s own individual experiences in relation to bullying, academic performance and peer connectedness. In the third stage, family-level variables were added and non-significant predictors were removed. In the fourth stage, community-level variables were added and non-significant predictors removed.

In the final model, two-way interactions were examined between alcohol consumption and age, and alcohol consumption and sex. In the non-linear model, the interactions were examined simultaneously with both alcohol consumption and alcohol consumption squared variables. For significant interactions, elasticity effects were produced to examine the strength and direction of these interactions (Norton, Wang, & Ai, 2004). Elasticities were produced using a wrapper program for imputed data (UCLA, 2012). Significant non-linear effects and interactions were further investigated by plotting the predicted probabilities of depressive symptoms separately for males and females.

The amount of the variance explained between schools in comparison to the null model was identified by subtracting the between schools variance ($\sigma^2_{\text{between}}$) for the null model from the between schools variance of each model ($\sigma^2_{\text{between}}$), and then dividing this by the between schools variance ($\sigma^2_{\text{between}}$) for the null model (Hayes, 2006). To examine the amount to which the alcohol variables explained the variance in psychological distress, each model was run with the alcohol variables removed. The amount of the variance explained by the alcohol variables was identified by subtracting the unexplained variance in the final model from the unexplained variance in the model with the alcohol variables removed.
Data Cleaning and Screening

The data was cleaned in accordance with procedures outlined for regression analytical techniques (Hox, 2010; Tabachnick & Fidel, 2013). Data screening included addressing data integrity, missing data, normality and multicollinearity.

**Data integrity.** At total of 151 cases were excluded from data analysis for responding dishonestly. This equates to less than 1.5% of participants who were excluded, indicating that most participants answered questions honestly.

**Missing data.** There was 11% of missing data on the dependent variable (K10 scores). There was less than 4% missing data on the independent variable (alcohol consumption). In regards to risk factors, community disorganisation had the greatest percentage of missing data (10.82%). In the descriptive statistics section, Table 14 outlines the percentage of missing data on all variables in the study.

Little’s Missing Completely At Random (MCAR) test was significant ($\chi^2 = 4053.61, df = 2607, p = <.001$), indicating that data was not missing completely at random. Further inspection of the data was undertaken, which revealed that missing data were randomly spread and there did not appear to be any patterns. Thus, data was considered to be missing at random. It was therefore appropriate to impute missing data. Missing data was imputed using regression procedures in STATA 11; a total of 20 imputations were made.

**Normality.** As the sample size is large it was assumed that the assumption of normality was met (Tabachnick & Fidel, 2013). In MLM, the group-level sample size is considered more important than the total sample size (Maas & Hox, 2005; Snijders, 2005). In school research, 50 groups is usually considered acceptable (Kreft & De Leeuw, 1998; Maas & Hox, 2005). In the current study, there were 190 groups (schools) sampled which equated to approximately 25% of the population size.
**Multicollinearity.** Regression procedures are sensitive to high correlations between predictor variables (Cohen, Cohen, West, & Aiken, 2003; Tabachnick & Fidel, 2013). Variance Inflation Factor (VIF), Tolerance scores (1/VIF) and Pearson correlation coefficient were used to examine for multicollinearity among all predictor variables in the study. VIF scores ranged from 1.01 to 1.65, and Tolerance scores ranged from 0.60 to 0.99. All VIF and Tolerance scores were within acceptable ranges (Cohen et al., 2003). Table 13 below displays the correlation matrix between all continuous predictor variables in the current study. The highest correlation between any two variables was .51, which was between age and pubertal stage. All correlations were within acceptable ranges and do not violate that assumption of multicollinearity (Tabachnick & Fidel, 2013).

Table 13

*Pearson Correlation Coefficients between Continuous Predictor Variables in Study 1*

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<td>3.</td>
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<td>4.</td>
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<td>.33</td>
<td>.19</td>
<td>.27</td>
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<tr>
<td>5.</td>
<td>-.19</td>
<td>-.17</td>
<td>-.23</td>
<td>-.36</td>
<td>-.47</td>
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<td>6.</td>
<td>.12</td>
<td>.07</td>
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<td>.25</td>
<td>.30</td>
<td>-.21</td>
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<tr>
<td>7.</td>
<td>.14</td>
<td>.09</td>
<td>.14</td>
<td>.19</td>
<td>.27</td>
<td>-.27</td>
<td>.41</td>
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<td>8.</td>
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*Note.* 1 = Age; 2 = Puberty; 3 = Academic failure; 4 = Family conflict; 5 = Poor family management; 6 = Family attachment; 7 = Community disorganisation; 8 = Low neighbourhood attachment.
Results

Descriptive Statistics

The final sample comprised 10,165 participants. Participant ages ranged from 11 to 17 ($M = 14.3$, $SD = 1.64$); 49% were male. The majority of the sample were Australian-born (87.16%) and lived in metropolitan areas (83.95%). The overall mean K10 score was 20.42 ($SD = 7.76$), with a mean of 19.73 ($SD = 7.56$) for males and 21.07 ($SD = 7.88$) for females. Approximately 60% of adolescents reported to have consumed alcohol at least once in their lifetime and 36.67% (95CI: 35.74, 37.65) reported to have consumed alcohol in the past 30 days. Alcohol consumption over the past 30 days increased with age: 11–13-year-olds (17.34%), 14–15-year-olds (36.75%), and 16–17-year-olds (60.01%). Past 30 days alcohol consumption was not significantly different between males (35.65%) and females (37.71%). Adolescents drinkers in the last 30 days reported significantly higher levels of psychological distress compared to non-drinkers, $t(8917) = -15.27$, $p < 0.001$. The descriptive statistics of all categorical and continuous variables in the current study are displayed in Table 14 below.
Table 14

Descriptive Statistics of Categorical and Continuous Variables in Study 1

<table>
<thead>
<tr>
<th>Categorical variables</th>
<th>Frequency (%)</th>
<th>N (%) missing</th>
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<tbody>
<tr>
<td>Psychological distress (≥ 30)</td>
<td>1289 (14.10)</td>
<td>9004 (11.42)</td>
</tr>
<tr>
<td>Alcohol consumption (yes)</td>
<td>3599 (36.67)</td>
<td>9815 (3.44)</td>
</tr>
<tr>
<td>Sex (female)</td>
<td>5143 (50.60)</td>
<td>10165 (0.00)</td>
</tr>
<tr>
<td>Weight (very overweight)</td>
<td>220 (2.21)</td>
<td>9928 (2.33)</td>
</tr>
<tr>
<td>Cigarette use (yes)</td>
<td>1126 (11.42)</td>
<td>9859 (3.01)</td>
</tr>
<tr>
<td>Marijuana use (yes)</td>
<td>418 (4.27)</td>
<td>9785 (3.74)</td>
</tr>
<tr>
<td>Bullying (yes)</td>
<td>4562 (45.40)</td>
<td>10048 (1.15)</td>
</tr>
<tr>
<td>Feels connected to peers (yes)</td>
<td>1191 (12.69)</td>
<td>9387 (7.65)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Continuous variables</th>
<th>Range</th>
<th>M</th>
<th>SD</th>
<th>n (%) missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>11-17</td>
<td>14.30</td>
<td>1.64</td>
<td>10162 (0.03)</td>
</tr>
<tr>
<td>Pubertal stage</td>
<td>1-5</td>
<td>3.62</td>
<td>0.82</td>
<td>9515 (6.39)</td>
</tr>
<tr>
<td>Academic failure</td>
<td>1-4</td>
<td>2.07</td>
<td>0.64</td>
<td>9921 (2.40)</td>
</tr>
<tr>
<td>Family conflict</td>
<td>1-4</td>
<td>2.25</td>
<td>0.83</td>
<td>9557 (5.98)</td>
</tr>
<tr>
<td>Poor family management</td>
<td>1-4</td>
<td>1.78</td>
<td>0.58</td>
<td>9829 (3.31)</td>
</tr>
<tr>
<td>Family attachment</td>
<td>1-4</td>
<td>3.04</td>
<td>0.69</td>
<td>9981 (1.81)</td>
</tr>
<tr>
<td>Community disorganisation</td>
<td>1-4</td>
<td>1.74</td>
<td>0.62</td>
<td>9065 (10.82)</td>
</tr>
<tr>
<td>Low neighbourhood attachment</td>
<td>1-4</td>
<td>1.87</td>
<td>0.73</td>
<td>9093 (10.55)</td>
</tr>
</tbody>
</table>
The prevalence of psychological distress is presented in Table 1 below. Close to one quarter (22.32%) of participants reported experiencing mild to moderate psychological distress and approximately 14.32% (95CI: 13.52, 15.52) reported high levels of psychological distress. Females reported significantly greater levels of psychological distress compared to males, \( t(9105) = -8.18, p < 0.001 \). There was a statistically significant difference in the prevalence of psychological distress between the three age groups as indicated by one-way ANOVA \( (F(2, 9002) = 58.70, p < 0.001) \). Post hoc comparisons using Bonferroni correction indicated that there was a significant increase with each age bracket \( (p <0.001) \): 12–13-year-olds \( (M = 19.24, SD = 7.59) \), 14–15-year-olds \( (M = 20.68, SD = 7.73) \), and 16–17-year-olds \( (M = 21.41, SD = 7.80) \).
Table 15

*Prevalence of Psychological Distress by Sex, Age and Living Region*

<table>
<thead>
<tr>
<th></th>
<th>No psychological distress</th>
<th>Mild to moderate</th>
<th>High</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(K10 scores ≤ 21)</td>
<td>(K10 scores 22-29)</td>
<td>(K10 scores ≥ 30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>95 CI</td>
<td>n</td>
</tr>
<tr>
<td>Overall prevalence</td>
<td>5705</td>
<td>63.36</td>
<td>62.2-64.5</td>
<td>2010</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2887</td>
<td>66.16</td>
<td>64.5-67.8</td>
<td>890</td>
</tr>
<tr>
<td>Female</td>
<td>2818</td>
<td>60.4</td>
<td>58.8-62.0</td>
<td>1120</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-13</td>
<td>2080</td>
<td>68.59</td>
<td>66.7-70.5</td>
<td>589</td>
</tr>
<tr>
<td>14-15</td>
<td>2035</td>
<td>63.00</td>
<td>61.1-64.9</td>
<td>739</td>
</tr>
<tr>
<td>16-17</td>
<td>1589</td>
<td>58.64</td>
<td>56.5-60.7</td>
<td>681</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metro</td>
<td>4809</td>
<td>62.73</td>
<td>61.5-63.9</td>
<td>1713</td>
</tr>
<tr>
<td>Non-metro</td>
<td>942</td>
<td>63.80</td>
<td>61.2-66.3</td>
<td>327</td>
</tr>
</tbody>
</table>

*Note.* Only the high category was used for analyses to test for differences between demographic categories. This was to ensure effects were due to psychological distress and not brief fluctuations in mood, which is common in adolescence. Thus, the p-value was calculated for the high category only.
Main Data Analysis

In this section, analyses addressed this study’s research questions and hypotheses. Table 16 presents the significant variables retained in each step of the MLM process for the linear model, which was the model with the most explanatory power, as non-linear effects were not identified.

In Model 1, with only the alcohol consumption variable in the model, alcohol consumption (OR = 1.60) was a significant predictor of psychological distress. Model 1 reduced the variance between schools by approximately 5% \([0.061 - 0.058] / 0.061\).
Table 16

*Linear Multilevel Model Predicting Psychological Distress Symptoms*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Null</th>
<th>Model 1 OR (95% CI)</th>
<th>p</th>
<th>Model 2 OR (95% CI)</th>
<th>p</th>
<th>Model 3 OR (95% CI)</th>
<th>p</th>
<th>Model 4 OR (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol use</td>
<td>1.60 (1.45, 1.76)</td>
<td>0.000</td>
<td></td>
<td>1.46 (1.30, 1.64)</td>
<td>0.000</td>
<td>1.43 (1.27, 1.60)</td>
<td>0.000</td>
<td>2.20 (1.60, 3.03)</td>
<td>0.000</td>
</tr>
<tr>
<td>Age</td>
<td>0.93 (0.90, 0.96)</td>
<td>0.000</td>
<td></td>
<td>0.91 (0.88, 0.94)</td>
<td>0.000</td>
<td>0.94 (0.90, 0.98)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarette use</td>
<td>1.28 (1.09, 1.50)</td>
<td>0.002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very overweight</td>
<td>2.29 (1.71, 3.06)</td>
<td>0.000</td>
<td></td>
<td>2.11 (1.58, 2.83)</td>
<td>0.000</td>
<td>2.02 (1.51, 2.72)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bullying</td>
<td>1.99 (1.80, 2.20)</td>
<td>0.000</td>
<td></td>
<td>1.78 (1.61, 1.98)</td>
<td>0.000</td>
<td>1.74 (1.57, 1.93)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic failure</td>
<td>1.53 (1.42, 1.66)</td>
<td>0.000</td>
<td></td>
<td>1.46 (1.35, 1.58)</td>
<td>0.000</td>
<td>1.42 (1.31, 1.54)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer connectedness</td>
<td>0.36 (0.31, 0.41)</td>
<td>0.000</td>
<td></td>
<td>0.39 (0.34, 0.45)</td>
<td>0.000</td>
<td>0.44 (0.38, 0.51)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family attachment</td>
<td>0.84 (0.78, 0.91)</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
<td>-0.89 (0.83, 0.97)</td>
<td>0.005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family conflict</td>
<td>1.36 (1.28, 1.46)</td>
<td>0.000</td>
<td></td>
<td>1.32 (1.23, 1.41)</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD</td>
<td>1.36 (1.10, 1.35)</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNA</td>
<td>1.27 (1.17, 1.38)</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol#age</td>
<td>0.90 (0.84, 0.96)</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N1 (individuals)</td>
<td>10165</td>
<td>10165</td>
<td>10165</td>
<td>10165</td>
<td>10165</td>
<td>10165</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N2 (schools)</td>
<td>190</td>
<td>190</td>
<td>190</td>
<td>190</td>
<td>190</td>
<td>190</td>
<td>190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>σ² between (schools)</td>
<td>0.061</td>
<td>0.058</td>
<td>0.053</td>
<td>0.059</td>
<td>0.051</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* OR = odds ratio; CI = confidence interval; σ² between = variance between schools; CD = Community disorganisation; LNA = Low neighbourhood attachment.
In Model 2, with the individual-level risk factors added to the model, alcohol consumption and age were significant predictors of psychological distress. Sex was not a significant predictor (OR = 1.02, 95CI: 0.93, 1.13; p = 0.624), and was therefore removed from the model. Model 2 reduced the variance between schools by approximately 13% [(0.061 – 0.053) / 0.061].

In Model 3, with the family-level risk factors added to the model, alcohol consumption (OR = 1.43) and age (OR = 0.91) remained significant predictors of psychological distress. Model 3 reduced the variance between schools by approximately 3% [(0.061 – 0.059) / 0.061].

In Model 4, with the community-level risk factors added to the model, there was a significant interaction between alcohol consumption and age (OR = 0.90) on psychological distress scores. No significant interaction between sex and alcohol consumption was identified (OR = 1.07, 95CI: 0.94, 1.22; p = 0.233). The final model accounted for approximately 16% of the variance in psychological distress between schools. Comparing the final model with and without the alcohol variable indicated that alcohol consumption explained approximately 3% of the variance.

To help with the interpretation of the interaction between alcohol consumption and age, marginal effects were produced. Marginal effects indicate the percentage increase in probability of high levels of psychological distress in drinkers compared to non-drinkers, when controlling for all variables in the final model. Elasticity results are plotted in Figure 4 below.
Figure 4. Probability of high levels of psychological distress for proportional change in past 30 days alcohol consumption for each age group.

Overall, the elasticity results indicated that younger drinkers were at the greatest risk of experiencing high levels of psychological distress, and that with increasing age the risk declines. The odds of drinkers developing psychological distress compared to non-drinkers declined with age: 11-year-olds (84%), 12-year-olds (67%), 13-year-olds (52%), 14-year-olds (39%), 15-year-olds (26%), 16-year-olds (15%) and 17-year-olds (4%). At age 11, the odds of developing high levels of psychological distress was 84% higher for drinkers compared to non-drinkers. While older adolescents were at an increased risk of psychological distress, elasticity results indicated that consuming alcohol in the past 30 days was generally not associated with significantly increased risk of psychological distress for participants aged 16 and 17 years. The largest proportional decrease in the risk of high levels of psychological distress occurred between ages 11 and 12 (20%). The smallest proportional decrease was 11%, which occurred between the ages of 15 and 16, and 16 and 17.
Discussion

The primary aim of this study was to further examine the cross-sectional association between non-clinical levels of alcohol consumption as a predictor of psychological distress in adolescents. The first hypothesis, that non-clinical alcohol consumption would be associated with significantly higher levels of psychological distress, after adjusting for age, sex, and other risk factors, was supported. The second hypothesis, that shape of the association between non-clinical alcohol consumption and psychological distress would be non-linear, was not supported. The third hypothesis, that alcohol consumption would be more strongly associated with psychological distress in younger adolescents compared to older adolescents, was supported. The current study did not identify significant differences in the association between males and females. The findings of this study suggest that alcohol consumption in early secondary school years is associated with a greater risk of psychological distress. Prevention efforts that reduce the proportion of children consuming alcohol in the early years is likely to have a substantial impact on the country’s health and welfare.

In the current study, approximately 14% of adolescents reported very high levels of psychological distress at levels indicative of a diagnosable mental disorder. This result is consistent with the most recent Australian prevalence statistics (Lawrence et al., 2015). The current study used a higher cut-off score on the K10 for the model building process, to increase the likelihood that elevated scores were due to mental health problems rather than a transient stressor or brief fluctuation in mood, as is common in adolescents. This approach has been used in previous adolescent studies (Andrews & Slade, 2001; Huang et al., 2009). The consistency in prevalence between the current study and national data supports the use of a higher cut-off score and the generalisability of results from this study.

Overall, 36% of participants scored above the standard clinical cut-off score on the K10, which is indicative of mild to moderate and high levels of psychological distress. More
females reported mild to moderate and high levels of psychological distress than males. These results were comparable to both Australian (Lawrence et al., 2015) and international prevalence studies (Arbour-Nicitopoulos et al., 2012; Balogun et al., 2013; Huang et al., 2009). While examining the prevalence of sub-clinical mental health problems is not the focus of this study, this result provides further evidence of the high prevalence of sub-clinical mental health problems during adolescence. In regards to prevention science, risk factors for sub-clinical mental health problems is an important area of study as sub-clinical mental health problems are associated with significant impairment in functioning (Angst et al., 2000) and increase the risk of clinical depressive disorders in adulthood (Aalto-Setala et al., 2014; Angst et al., 2000; Pine et al., 1999). The findings of the current study, that approximately one-third of adolescents experienced clinically significant psychological distress, in conjunction with past studies that demonstrate similar rates of psychological distress (Arbour-Nicitopoulos et al., 2012; Huang et al., 2009), highlights the need for investment in prevention approaches to mental health problems in school-aged populations.

In regards to alcohol consumption, 60% of participants reported they had consumed alcohol at least once in their lifetime and 37% in the past 30 days. The prevalence of alcohol consumption was comparable between males and females. As expected, alcohol consumption increased with age. In both sexes, alcohol consumption increased steadily with age for both lifetime and past 30 days consumption. The prevalence of alcohol consumption was comparable with Australian epidemiological data (White & Bariola, 2012). Therefore, the findings in this study may be generalisable to other samples.

**Hypothesis 1 and Hypothesis 2**

The results of the MLM supported the hypothesis that alcohol consumption was associated with significantly higher levels of psychological distress after controlling for a range of risk factors. The results, however, did not support the hypothesis that this association
would follow a non-linear pattern. Rather the results suggested that the linear model had the most explanatory power, as non-linear effects were not identified. This result is consistent with cross-sectional evidence (Skogen et al., 2014); however, it is inconsistent with longitudinal evidence (Owens et al., 2008). Past longitudinal research suggested a curvilinear association between alcohol consumption and depressive affect (Owens et al., 2008). The results suggested that less frequent drinking at baseline was associated with increases in depressive symptoms that became increasingly larger over time.

There are a number of possible explanations that may explain the inconsistency between the current study’s findings and longitudinal evidence. The cross-sectional design of the current study prevented examination of changes over time. Non-linear effects are likely linked with developmental changes over time that are best detected by longitudinal studies. Also, non-linear associations may exist between drinking frequency and depressive symptoms. As the current study modelled alcohol consumption as a dichotomous variable (i.e. drinkers vs non-drinkers) it was unable to examine the association across increasing drinking frequency. Non-linear patterns in the association might be identified by studies that examine the association between increasing drinking frequency and quantity, and depressive symptoms. As identified in adult studies, non-drinking, moderate drinking and heavy drinking patterns are differentially associated with depressive symptoms (Alati et al., 2005; Caldwell et al., 2002; Rodgers et al., 2000).

Unlike the current study, previous longitudinal research did not control for potential confounders (Owens et al., 2008). The association between alcohol consumption and depressive symptoms is likely complex, and any non-linear associations that exist may be influenced by potential mediating or moderating variables. For example, adolescents who abstain from alcohol or engage in infrequent drinking may be less socially connected with their peers. Whereas adolescents who drink more regularly may be more socially connected,
and the benefits of this social connection may protect against depressive symptoms. In addition, the nature of the association between alcohol consumption and depressive symptoms may vary throughout adolescence according to age. There is a need for future longitudinal studies that examine non-linear associations and control for the confounding effects with correlates of psychological distress.

**Hypothesis 3**

The results from the MLM support the hypothesis that the association between alcohol consumption and very high levels of psychological distress would be stronger in younger adolescents and decline with increasing age. Elasticity estimates were used to interpret the interaction between age and alcohol consumption on psychological distress to model how the changes in consumption status is linked to changes in adolescent psychological distress. The results indicated that younger adolescent drinkers were at the greatest risk of psychological distress. Participants aged 11 who consumed alcohol had the highest increase in the probability of psychological distress (OR = 1.84). At age 11, the odds of experiencing very high levels of psychological distress were 84% higher in drinkers compared to non-drinkers. The probability declined with increasing age. At ages 12, 13, 14 and 15 the risk of psychological distress was 67%, 52%, 28% and 26% higher in drinkers compared to non-drinkers, respectively. At ages 16 and 17, the risk of psychological distress in drinkers compared to non-drinkers decreased to 14% and 4%, respectively. This finding suggests that in late adolescence other individual, family or school/peer factors are stronger predictors of psychological distress than alcohol consumption.

The significant interaction between age and alcohol consumption on psychological distress is partially consistent with previous cross-sectional studies that examined this effect with frequent alcohol use. In the Netherlands, regular weekly alcohol consumption was associated with depressive symptoms in adolescents aged 12 to 13 years, although not in
adolescents aged 14 to 16 years (Verdurmen et al., 2005). Whereas, in the current study, whilst the effect was stronger among younger adolescents, in participants aged 14 to 16 years, non-clinical levels of alcohol consumption were estimated to increase the risk of psychological distress by 39% for 13-year-olds, 26% for 15-year-olds and 15% for 16-year-olds. These results suggest that alcohol consumption in early adolescence is associated with greater levels of harmful mental health symptoms, compared to older adolescents.

In Canada, heavy episodic drinking was associated with an increased probability of very elevated depressive symptoms in female adolescents only; however, the risk was greatest at age 14 (OR = 1.18) (Poulin et al., 2004). In line with the current study, the risk declined after age 14 and the risk was lowest among older adolescents, although for females only. Inconsistent with the current study, heavy episodic drinking was not associated with elevated depressive symptoms in males at any age (Poulin et al., 2004).

Conversely, cross-sectional evidence in Norway suggests there is no interaction between alcohol consumption and age (Myklestad et al., 2012; Skogen et al., 2014). From early to late adolescence, increasing frequency of being drunk predicted increases in psychological distress that did not vary according to age (Myklestad et al., 2012). Similarly, excessive alcohol consumption and alcohol intoxication was a strong predictor of depressive symptoms at all ages (Skogen et al., 2014).

Overall, the current evidence base possibly suggests that moderating effects of age may vary across drinking patterns. Heavier drinking may be linked with an increased risk for depression at all ages. However, perhaps more normative and lower level drinking are linked with changes across age. Thus, younger adolescents may be more susceptible to the effects of alcohol consumption, even at low experimental levels compared to older adolescents. Alcohol initiation in early adolescence, even at low doses, may contribute to the development
of mental health problems in young adolescents compared with older adolescents, where experimenting with alcohol is a high-prevalent behaviour. However, these conclusions are tentative at best, given they are based on cross-sectional evidence that cannot assess the temporal nature of the association.

**Mediating Effects of Biological Sex**

From an exploratory perspective, an interaction between alcohol consumption and psychological distress was examined. The results suggested that after controlling for confounding factors, the association between alcohol consumption and psychological distress did not differ between males and females. Previous research addressing this question has been mixed. The current study is consistent with a number of studies that have identified no difference in the association in males and females (Clark et al., 2007; Fleming et al., 2008; Verdurmen et al., 2005). However, some studies have demonstrated that the association differs by sex, such that alcohol consumption is a significant predictor for either only females (Poulin et al., 2004) or only males (Skogen et al., 2014). While other studies suggest alcohol consumption is a significant predictor for both sexes, alcohol consumption was a stronger predictor of depression in females compared to males (Owens et al., 2008; Marmorstein, 2009; Yue et al., 2015).

Overall, it remains unclear within the literature whether the association between alcohol consumption as a predictive factor for depression in adolescents differs between males and females. The studies that have examined this research question vary widely in respect to the measurement of alcohol consumption. The association may vary between males and females depending on the type of drinking pattern. For example, there may be no difference in the association for non-clinical levels of alcohol consumption that are normative behaviours for both sexes. However, heavier drinking patterns among females may be less
socially acceptable and thus be associated with greater interpersonal difficulties, which may increase the risk of psychological problems in female adolescents.

**Limitations**

While this study has demonstrated an association between non-clinical levels of alcohol consumption and psychological distress that is moderated by age, this study has a number of limitations that need to be considered. The cross-sectional design precludes any conclusions regarding causality and the temporal nature of this association. Thus, the results of this study cannot rule out the self-medication hypothesis as a possible explanation for the association between alcohol consumption and psychological distress. It is also possible that the association between alcohol consumption and psychological distress is due to shared underlying risk factors such as family conflict. For example, adolescents exposed to high levels of family conflict may have higher rates of both alcohol consumption and psychological distress. The current study, however, has controlled for a wide range of factors including family conflict.

In the current study, there were only a small number of participants aged 11. The results indicated that drinking at age 11 was associated with the greatest risks for high levels of psychological distress. Given the small number of participants aged 11, it is possible the magnitude of the effect at this age was over-estimated. Overall, however, the current study employed a large sample size and results suggested that younger adolescents were at especially higher risk for psychological distress.

The current study focused on examining non-clinical alcohol consumption and mental health problems, which is an important area of research for prevention. This study did not control for participants who may have engaged in heavier patterns of drinking in the past month. Therefore, this study cannot determine whether non-clinical patterns of alcohol
consumption are directly linked to increases in psychological distress, as heavier drinking patterns may account for this effect.

In addition, this study did not control for low self-esteem (Orth, Robins, & Roberts, 2008) and parental depression (Goodman et al., 2011), which are associated with an increased risk of depressive symptoms in adolescence. However, the current study did control for a wide range of potential confounding factors at the individual, family, school and community levels.

As the questionnaire was administered in schools, early school leavers and those frequently not attending school are likely to be underrepresented in the current study. Prior research indicates that truant and early school leavers tend to experience higher prevalence of substance use and depression (Esch et al., 2014; Townshend, Flisher, & King, 2007). Therefore, the results may not be generalisable to this high-risk adolescent population.

Conclusion and Future Directions

The results of the current study add to the extant literature examining alcohol consumption as a predictor of depression in adolescents. This study demonstrated that alcohol consumption is a stronger predictor of depression in younger adolescents. This finding supports current Australian guidelines that urge parents and adolescents under the age of 15 to delay alcohol initiation (NHMRC, 2009a). In late adolescence, alcohol consumption remains a significant predictor of depression but may be less important than other factors during this developmental stage, when alcohol consumption is commonplace. The association did not vary across sexes, suggesting that non-clinical levels of alcohol consumption may have similar effects on risk for depression in both male and female adolescents. In regards to prevention and early intervention, the results of this study indicate that preventative efforts to reduce alcohol consumption should target early adolescents and both sexes. Longitudinal
studies are needed to better understand the temporal nature of this association, particularly the effects of age and possible non-linear patterns that might show over time.
Chapter 7: Study 2

Does Alcohol Consumption Predict Depressive Symptoms One Year Later?

Study Overview

This chapter presents a study examining whether alcohol consumption predicts depressive symptoms one year later in adolescence. The data were drawn from the Australian cohort of the IYDS. First, this chapter reiterates the gaps in the extant literature before outlining the aims, research questions and hypotheses of this study. The subsequent sections present the methodology, results and discussion.

Aims, Research Questions and Hypotheses

The current study aimed to build on Study 1. This study found that younger adolescents who had consumed non-clinical levels of alcohol were at the greatest risk of psychological distress compared to older drinkers. Using longitudinal data from the IYDS, Study 2 aimed to examine the temporal nature of the reverse hypothesis over time. The current study posed three research questions:

RQ1: Is the temporal association between non-clinical alcohol consumption at baseline as a predictor of depressive symptoms one year later non-linear?

RQ2: Is the temporal association between non-clinical alcohol consumption as a predictor of depressive symptoms one year later moderated by age?

RQ3: Is the temporal association between non-clinical alcohol consumption as a predictor of depressive symptoms one year later moderated by biological sex?

In line with existing theoretical and empirical literature, three hypotheses were developed. As previously discussed, development is not limited to linear patterns. However, few studies have specifically examined whether the association between alcohol consumption and depression is non-linear in adolescence (Owens et al., 2008; Skogen et al., 2014).
Identifying the shape of the trajectory is crucial to identifying points for prevention and intervention. While Study 1 did not identify a non-linear association between psychological distress and alcohol consumption, longitudinal studies are a more appropriate methodological design for examining the shape of developmental changes (Willett et al., 1998).

Studies with adults suggest the co-occurrence between depression and alcohol consumption is non-linear, following a J-shaped or U-shaped pattern (Alati et al., 2005; Coelho et al., 2014; Rodgers et al., 2000). This pattern indicates that moderate drinkers are at the lowest risk for depression, compared to abstainers and heavy drinkers. A possible explanation for this finding is that moderate drinking is often undertaken in a social context. Therefore, this behaviour is associated with positive benefits through socialising and feelings of belongingness, which protect against depression (Rodgers et al., 2000). In adolescence, socialising with peers and gaining peer acceptance becomes increasingly important and thus the social benefits of these interactions may protect against depression.

Alternatively, the association between depression and alcohol consumption in adolescents may be non-linear due to different timings in developmental changes (Steinberg, 2010). As discussed in Chapter 2, the different developmental timings between an early maturing social-emotional system (dopaminergic) and a slower maturing self-regulatory system (pre-frontal cortex) contributes to increases in risk-taking behaviour during adolescence, including alcohol use (Steinberg, 2010). The increase in novelty seeking in adolescence contributes to an increase in risk-taking behaviour, prior to the maturation of the self-regulation systems that inhibit impulsive and risky behaviours (Spear, 2000; Steinberg, 2010). The temporal gap between the development of novelty seeking and self-regulation capacity in adolescence seems to suggest the association between depression and alcohol use may not always be linear.
Some theories also suggest that self-regulation capacities exist on a continuum, from low self-control to high self-control (Block & Block, 1980; Block & Kremen, 1996; Steinberg, 2010). It has been suggested that adolescents low in novelty seeking and high in self-control are at greater risk for depression. Whereas, individuals high in novelty seeking and low in self-regulation are more likely to engage in alcohol use. There has been some empirical support for this theory (Ernst et al., 2006; Murray & Kochanska, 2002; Willoughby & Fortner, 2015). Emerging evidence suggests low self-control is associated with externalising problems and high self-control is associated with internalising problems (Willoughby & Fortner, 2015). Thus, the evidence seems to suggest that when depression and alcohol use co-occur, the association between these problems may follow a non-linear pattern.

On the basis of this evidence, both linear and non-linear associations were examined. However, due to differences in developmental timings it is expected the non-linear association will have more explanatory power. The following hypotheses were made:

H1: It is hypothesised that alcohol consumption at Time 1 will be a significant predictor of depressive symptoms one year later after controlling for baseline depressive symptoms, age, sex and other risk factors.

H2: It is predicted that the shape of this association between non-clinical levels of alcohol consumption and depressive symptoms will follow a non-linear pattern.

As identified in Study 1, there was a significant interaction between age and non-clinical levels of alcohol consumption. The findings of this study extended past research by demonstrating that non-clinical levels of alcohol consumption were associated with a greater risk of psychological distress in younger adolescents compared to older adolescents. Previous research had focused on examining this effect with patterns of heavy drinking, which
identified similar effects, thus indicating that younger adolescents engaging in heavy drinking were at greater risk for higher levels of depressive symptoms than older drinkers (Marmorstein, 2009; Myklestad et al., 2012; Verdurmen et al., 2005). The current study will examine the interaction between age and alcohol consumption in a longitudinal design, which will be able to assess developmental patterns across time. On the basis of this evidence, interactions between age and alcohol consumption, and biological sex and alcohol consumption will be examined. Interactions will be examined in the model (linear or non-linear model) with the most explanatory power. The following hypothesis was made:

H3: The association between past 30 days alcohol consumption at baseline and depressive symptoms one year later will be moderated by age while controlling for baseline depressive symptoms, sex and other risk factors. Specifically, it is predicted that younger adolescents who consume alcohol will be at greater risk for depression than older adolescents who consume alcohol.

In line with Study 1, no hypothesis regarding sex differences in the association was made. Given that previous research findings are mixed and Study 1 did not identify a significant interaction between sex and non-clinical levels of alcohol consumption, the effects of sex on the association were examined from an exploratory perspective.

Method

Participants

Participants were recruited using a two-stage cluster sampling approach for the recruitment of schools and students, as described in Study 1. Special schools were excluded. In 2002, there were three cohorts of participants sampled: youngest (Year 5), middle (Year 7) and oldest (Year 9). In wave 2, the same students were followed up one year later in 2003.
Overall, 3,926 students were eligible to participate in the study from across 152 schools. Of the eligible participants, 73.5% completed the questionnaire at Time 1; yielding a sample of 2,884 participants (48% males). There were 926 participants in the youngest cohort (age: $M = 10.98$, $SD = 0.40$), 984 in the middle cohort (age: $M = 12.93$, $SD = 0.41$), and 974 in the oldest cohort (age: $M = 14.89$, $SD = 0.39$). Retention rates were high with 98.65% of the original sample completing the questionnaire in Time 2. The final sample was representative of school students in Victoria (McMorris et al., 2007). The proportion of government (69.3%), Catholic (21.7%) and private (9.0%) schools in the study were similar to the percentages of schools in the state.

**Measures**

The IYDS questionnaire is a self-report measure that was adapted from the Communities That Care (CTC) Youth Survey (Glaser et al., 2005). The CTC Youth Survey has good reliability and validity in Australian (Bond et al., 1998) and US (Glaser et al., 2005) school samples. The CTC is a comprehensive questionnaire of the predictors of health and behavioural outcomes. The CTC uses validated scales when available and the IYDS questionnaire also includes honesty measures. For the current study, there were three cohorts: youngest, middle and oldest. The questionnaire for the youngest cohort (Year 5) was simplified to ensure it was age appropriate. The variables from the IYDS questionnaire that were included in the current study are described below.

**Dependent variable.** Depressive symptoms were assessed by the Short Mood and Feelings Questionnaire (SMFQ) at Time 1 and Time 2 (Angold et al., 1995). SMFQ scores at Time 1 assessed baseline depressive symptoms and SMFQ scores at Time 1 was the dependent variable. The SMFQ was designed for use in child and adolescent epidemiological studies and has good internal consistency (Cronbach’s $\alpha = 0.85$) (Angold et al., 1995). It also has a strong correlation with other measures of childhood and adolescent depression such as
the Children's Depression Inventory (Kovacs, 1985) and the longer version of the Mood and Feelings Questionnaire (Wood, Kroll, Moore, & Harrington, 1995). In the current study, the SMFQ demonstrated good internal consistency in the middle and oldest cohorts (Cronbach’s α = .87), and in the youngest cohort (Cronbach’s α = .85).

The SMFQ comprises 13 items rated on a 3-point Likert scale (2 = true, 1 = sometimes true, 0 = not true). Total scores ranged from 0 to 26 with higher scores indicating higher levels of depressive symptoms (Angold et al., 1995). Scores above 11 are commonly used to signify clinically significant depressive symptoms (McKenzie et al., 2011; Patton et al., 2008; Rhew et al., 2010; Thapar & McGuffin, 1998). In the current study, scores ranging from 11 to 15 indicated moderate levels of depressive symptoms and scores above 15 (90th percentile) signified high levels of depressive symptoms.

**Independent variable.** Alcohol consumption was measured at Time 1. Participants in the middle and oldest cohorts were asked, “*In the past 30 days on how many occasions have you had more than just a few sips of an alcoholic beverage (like beer, wine or liquor/spirits)?*” Response options were reported on an 8-point scale: ‘never’, ‘1 to 2 times’, ‘3 to 5 times’, ‘6 to 9 times’, ’10 to 19 times’, ‘20 to 29 times’, ‘30 to 39 times’, and ‘40 or more times’.

Participants in the youngest cohort were asked a similar question. However, as consumption is less prevalent in this age group the measure assessed lifetime consumption rather than the last 30 days. Participants in the youngest cohort were asked “*Have you ever had more than just a sip or two of an alcoholic drink (like beer, wine, or liquor/spirits)?*” Response options were reported on a 4-point scale: ‘never’; ‘yes, but not in the last year’; ‘yes, 1 to 2 times in the last year’; and ‘yes, 3 or more times in the last year’.
This question was based on similar questions asked in previous national alcohol studies (Johnson et al., 2011; White & Bariola, 2012). One-item measures have been demonstrated to be a reliable and valid instrument for assessing adolescent alcohol consumption (Dollinger & Malmguist, 2009; Koning et al., 2010).

For the analysis, one alcohol consumption variable across the three cohorts was formed. After careful consideration, it was decided that the two scales were best combined into one variable that indicated recent alcohol consumption with three points: ‘none’, ‘1 to 2 times’, and ‘3 or more times’. First, responses from the middle and oldest cohorts were condensed. Participants who indicated they had consumed alcohol between ‘3 to 5 times’ and ‘40 or more times’ were assigned to the ‘3 or more times’ category on this new alcohol consumption variable. Participants in the middle and oldest cohorts who indicated they had ‘never’ used alcohol in the past 30 days remained in the same category, now referred to as ‘none’. Participants who indicated they had consumed alcohol ‘1 to 2 times’ in the past 30 days also remained in the same category on this new variable.

Second, responses from the youngest cohorts were reassigned. Participants who indicated they had ‘never’ or ‘yes, but not in the last year’ consumed alcohol in their lifetime, were assigned to the ‘none’ category on this new measure of recent alcohol consumption variable. Participants who indicated they had consumed alcohol ‘1 to 2 times in the last year’ were assigned to the ‘1 to 2 times’ category on this measure of recent alcohol consumption variable. Participants who indicated they had consumed alcohol ‘3 or more times in the last year’ were assigned to the ‘3 or more times’ category on this measure of recent alcohol consumption.

**Covariates.** All covariates were measured at Time 1. As in Study 1, the selection of covariates was based on the findings from the literature review presented earlier. When the
data were available, risk factors identified in Chapter 3 were included in this study to control for factors that may confound the association between alcohol consumption and depressive symptoms in adolescents. Many of the covariates included in this study were described in Study 1; therefore, to avoid repetition the description of the measures here will be kept brief. Where information regarding the psychometric properties of the variables was previously reported in Study 1, this will not be restated in this chapter. Covariates were organised into distal and proximal categories: individual, family, school and community.

**Individual level.** Individual-level covariates were sex, age, pubertal stage, cigarette use, marijuana use and low self-esteem.

*Sex and age.* Participants were asked to provide information regarding their biological sex and age in years. Sex was dichotomous with a score of zero for ‘male’ and a score of one for ‘female’. Age was a continuous variable.

*Pubertal development.* As in Study 1, pubertal development was assessed using the Self-Rating Scale for Pubertal Development (student version) (Carskadon & Acebo, 199; Petersen et al., 1998). Study 2 also included two additional questions that assessed participant’s pubertal development according to the Tanner Stages. On each item, participants were presented with five pictures that displayed images of secondary sexual characteristics (i.e. enlargement of the breasts and areola, or enlargement of the scrotum and testes) (Malina & Bouchard, 1991). Participants were asked to select the picture that looks most like their body now. Each picture displayed external changes related to the five stages of pubertal development: pre-pubertal, early pubertal, mid-pubertal, late pubertal and post-pubertal (see Appendix G for gender specific questions).

The total pubertal development score was calculated by summing the scores from each item. In the current study, the total score ranged from one to five, with higher scores
indicating a later pubertal phase. In the current study, there was acceptable internal consistency among items on the measure for both males (Cronbach’s $\alpha = .79$) and females (Cronbach’s $\alpha = .73$) in the middle and oldest cohorts. In the youngest cohort, internal consistency was lower for both males (Cronbach’s $\alpha = .61$) and females (Cronbach’s $\alpha = .60$).

**Lifetime cigarette use** was assessed by asking participants, "*Have you ever smoked cigarettes?*" (Participants in the youngest cohort were asked, "*Have you ever smoke a cigarette, even just a puff?*"). For the middle and oldest cohorts, responses were reported on a five-point scale ranging from “never” to “regularly now”. For the youngest cohort, responses were reported on a four-point scale ranging from “no, never” to “yes, 3 or more times”. For all cohorts, lifetime cigarette use is a dichotomous variable with a score of zero for ‘no lifetime use’ and a score of one for ‘any use’.

**Lifetime marijuana use** was assessed by asking participants, "*In your lifetime on how many occasions (if any) have you used marijuana (pot, weed, grass)?*" (Participants in the youngest cohort were asked, "*Have you ever used marijuana (pot, weed, grass)?*”). For the middle and oldest cohorts, responses were reported on an eight-point scale ranging from “never” to “40+ times”. For the youngest cohort, responses were reported on a four-point scale ranging from “no, never” to “yes, 3 or more times in the last year”. For all cohorts, lifetime marijuana use is a dichotomous variable with a score of zero for ‘no lifetime use’ and a score of one for ‘any use’.

**Self-esteem** was assessed using one five-item subscale from the Rosenberg Self-Esteem Scale (Rosenberg, 1965). In previous adolescent studies, the measure demonstrated acceptable internal consistency with Cronbach’s alpha for each subscale ranging from .77 to .88 (Bagley, Bolitho, & Bertrand, 1997; Rosenberg, 1965). Test-retest reliability ranged from .82 to .85 (Bagley et al., 1997; Rosenberg, 1965). The items assessed participants’ self-
perception of their own qualities, abilities and attitudes towards themselves in the past month. For example, one item asked “In the past 30 days, I felt that I had a number of good qualities”. For the purpose of brevity, response options were modified with the original four-point scale condensed to a three-point scale in this study. Response options were “true”, “sometimes true” and “not true”. Self-esteem is a continuous variable with higher scores indicating greater levels of self-esteem. In the current study, there was acceptable internal consistency in the middle and oldest cohorts (Cronbach’s $\alpha = .78$), and in the youngest cohort (Cronbach’s $\alpha = .71$).

**School-level risk factors.** School-level covariates were bullying victimisation and academic failure.

**Bullying victimisation** was assessed using one item that combined four questions from the Gatehouse Bullying Scale (Bond et al., 2007) used in Study 1. Participants were asked, “Have you been bullied recently (teased or called names, had rumours spread about you, been deliberately left out of things, threatened physically or actually hurt)?” Responses were reported on a four-point scale ranging from ‘no’ to ‘yes, most days’. Bully victimisation was a continuous variable with higher scores indicating more frequent experiences of bullying.

**Academic failure** was assessed using the same two-item scale described in Study 1 (Bond et al., 2000). Academic failure was a continuous variable with total scores ranging from one to four, and higher scores indicating poorer academic performance. In the current study, there was acceptable internal consistency (Cronbach’s $\alpha = .67$).

**Family-level.** Family-level covariates were family conflict, poor family management, family attachment and family SES.
Family conflict was assessed using the same three-item scale described in Study 1 (Hawkins et al., 1999). Family conflict was a continuous variable with total scores ranging from one to four, and higher scores indicating higher levels of family conflict. In the current study, there was acceptable internal consistency in the middle and oldest cohorts (Cronbach’s α = .79), and in the youngest cohort (Cronbach’s α = .76).

Poor family management was assessed using a nine-item scale from the SSDP, Family Skills Scale (Hawkins et al., 1999). The six-item version of this scale was described in Study 1. The only difference between the two scales is that the one used in this study has three additional items. Poor family management was a continuous variable with total scores ranging from one to four, and higher scores indicating poorer family management practices. In the current study, there was acceptable internal consistency in the middle and oldest cohorts (Cronbach’s α = .79), and in the youngest cohort (Cronbach’s α = .73).

Family attachment was assessed using the same four-item scale described in Study 1 (Hawkins et al., 1999). Family attachment was a continuous variable with total scores ranging from one to four, and higher scores indicating greater family attachment. In the current study, there was acceptable internal consistency in the middle and oldest cohorts (Cronbach’s α = .76), and in the youngest cohort (Cronbach’s α = .70).

Community-level risk factors. Community-level covariates were community disorganisation and low neighbourhood attachment.

Community disorganisation was assessed using the same five-item scale described in Study 1 (Hawkins et al., 1999). Total scores ranged from one to four with higher scores indicating greater community disorganisation. In the current study, there was acceptable internal consistency in the middle and oldest cohorts (Cronbach’s α = .78), and in the youngest cohort (Cronbach’s α = .68).
Low neighbourhood attachment was assessed using the same three-item scale described in Study 1 (Hawkins et al., 1999). Total scores ranged from one to four with higher scores indicating lower levels of neighbourhood attachment. In the current study, there was acceptable internal consistency in the middle and oldest cohorts (Cronbach’s $\alpha = .81$), and in the youngest cohort (Cronbach’s $\alpha = .82$).

Honesty measure. An honesty variable was created from several items to ensure participants answered the questionnaire honestly. Participants in all cohorts were asked, “How honest were you in filling out this survey?” Response options were on a five-point scale ranging from ‘I was honest all the time’ to ‘I was not honest at all’. Participants were also asked, “In the past 30 days on home many occasions (if any) have you used derbisol?” Derbisol is a fictitious drug included to identify participants who were responding dishonestly. Response options were on an eight-point scale ranging from ‘never’ to ‘40+ times’. Response option ‘never’ was coded 0 and all other responses were coded 1. In addition, participants in the middle and oldest cohorts were identified as dishonest if they reported they had used illicit drugs on more than 120 occasions in the past 30 days. A single measure of honesty ($0 = $dishonest, $1 = $honest) was calculated using these items. Participants who were identified as responding dishonestly on one or more of the three items were excluded from analyses.

Procedure

Prior to commencing the project, ethics approval was obtained from the Royal Children’s Hospital Ethics in Human Research Committee. Permission was also sought from the Royal Children’s Hospital to conduct secondary data analysis to address the research aims outlined in this thesis. Permission to conduct research in schools was also sought from DEECD Research Office, the Victorian Catholic Education Office and directly from private schools.
As described previously, a two-stage cluster sampling approach was used for the recruitment of schools and students. To ensure the study had adequate statistical power, a target sample of 1000 students from each of the year levels (5, 7 and 9) was desired. Schools were randomly selected and substitute schools were also selected at random to replace schools that declined to participate. Principals were contacted and provided consent before students were approached to participate in the study.

In the second stage, one classroom from each of the year levels in each participating school was randomly selected. For Year 5, one class within each school was randomly selected from a list of all Year 5 classes which was provided by the school (McMorris et al., 2007). For Years 7 and 9, one class from each year level within each of the schools was randomly selected from a list of English classes. However, if English classes were assigned based on ability or if English classes were unavailable, an alternative class was used to randomly select target classes from each school. Information packs were provided to students and parents, and written consent was sought from parents within two weeks of receiving the information. Students received a pocket calculator upon return of their consent as an incentive to participate.

The delivery of questionnaires was coordinated by the Centre of Adolescent Health at the Murdoch Children's Research Institute, Royal Children's Hospital, the University of Melbourne. Staff administering the questionnaire were trained in a single protocol to reduce the variability in data collection procedures (McMorris et al., 2007). Questionnaires were administered in Victoria during May to November in 2002 and repeated again during the same months in 2003. On the day of administration, students were informed of steps taken to ensure their confidentiality and were presented with standardised instructions.
Students in all year levels completed the surveys during class time under supervision. The instructions were written for all students, except students in Year 5, where the instructions were read aloud, while another staff member was available to help students understand the instructions. The questionnaires took approximately 50 to 60 minutes and were administered in the classroom. Students who were absent on the day were administered questionnaires later under the supervision of trained staff.

**Analytical Strategy**

As in Study 1, all analyses were conducted in STATA 11.0 (StataCorp LP, College Station, TX). Prior to conducting the main analyses, a series of data cleaning processes were undertaken to reduce measurement error and ensure the underlying assumptions of the MLM statistical technique were met. Descriptive statistics were computed.

The intra-class correlation (ICC) within schools indicated that the within-group (school) homogeneity for the dependent variable (SMFQ scores) was 0.06 (95CI: .04-.09) and was significant at the .05 level. This suggested that the statistical techniques that allow for clustered data should be undertaken. Thus, the MLM was used to examine linear and non-linear (parabolic) effects in the association between alcohol consumption at Time 1 as a predictor of depressive symptoms at Time 2. During the model building process, two models were constructed using the same analytical procedure. One model examined linear associations between alcohol consumption and depressive symptoms, and the other examined non-linear associations between these two variables. The best fitting model was reported in the results section.

Prior to examining non-linear associations, preliminary data analysis was conducted to examine for patterns in the association between alcohol consumption at Time 1 and depressive symptoms at Time 2. As described in the results section, preliminary data analysis
indicated that a curvilinear association may exist between the two variables. This is also consistent with developmental theory and evidence (Owens et al., 2008). Therefore, parabolic non-linear associations between alcohol consumption and depressive symptoms were examined. As in Study 1, to examine possible J- and U-shaped associations a quadratic alcohol use variable was created for inclusion in the model building process. The alcohol consumption variable (1 = no use, 2 = 1-2 times, and 3 = 3+ times) was re-coded. To create the quadratic variable, alcohol consumption was squared and the new values were 2 (never), 4 (1-2 times), and 9 (3+ times). When examining non-linear associations with depressive symptoms, both alcohol consumption and alcohol consumption squared were included in the model building process simultaneously.

To test the hypotheses, a multilevel regression with depressive symptoms (SMFQ scores were continuous) as the dependent variable was developed. This modelled individuals (N = 2,835) nested within schools, with random effects estimation specified for the school-level (N = 154 schools). An overall model was then built by adding variables, beginning with most proximal (individual level) and finishing with the most distal (community level) (Goldstein, 2011; Rabe-Hesketh & Skrondal, 2008). P levels of < 0.05 were considered significant. Non-significant predictors were removed throughout the model building process.

Each model was built in four stages. First, a null model with only a random intercept (varying by school) was produced. This provided a baseline comparison of the school-level variance in predicting depressive symptoms at Time 2, which allowed for estimation of the contribution of variables hierarchically added in subsequent models to reducing school variance (Goldstein, 2011; Rabe-Hesketh & Skrondal, 2008). In the second stage, individual-level variables (including school-level) were entered into the model and non-significant predictors were removed. School-level variables were entered at the individual level, as these variables were a measure of each participant’s own individual experiences in relation to
bullying and academic performance. In the third stage, family-level variables were added and non-significant predictors were removed. In the fourth stage, community-level variables were added and non-significant predictors removed.

In the final model, two-way interactions were examined between alcohol consumption and age, and alcohol consumption and sex. In the non-linear model, the interactions were examined simultaneously with both alcohol consumption and alcohol consumption squared variables. For significant interactions, elasticity effects were produced to examine the strength and direction of these interactions (Norton et al., 2004). Significant non-linear effects and interactions were further investigated by plotting the predicted probabilities of depressive symptoms separately for males and females.

The Log likelihood, Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used to examine model fit and improvement. The amount of the variance explained between schools in comparison to the null model was identified by subtracting the between schools variance (\( \sigma^2_{\text{between}} \)) for the null model from the between schools variance of each model (\( \sigma^2_{\text{between}} \)), and then dividing this by the between schools variance (\( \sigma^2_{\text{between}} \)) for the null model. To examine the amount to which the alcohol variables explained the variance in depressive symptoms, each model was run with the alcohol variables removed. The amount of the variance explained by the alcohol variables was identified by subtracting the unexplained variance in the final model from the unexplained variance in the model with the alcohol variables removed.
Results

Data Cleaning and Screening

The data was cleaned in accordance with procedures outlined for regression analytical techniques (Hox, 2010; Tabachnick & Fidel, 2013). Data screening included addressing data integrity, missing data, normality, and multicollinearity.

Data integrity. A total of 49 cases (Time 1: \( n = 20 \), Time 2: \( n = 34 \) including 5 participants that had also responded dishonestly at Time 1) were excluded from data analysis for responding dishonestly. This equates to less than 1% of participants who were excluded from each wave, suggesting that most participants answered questions honestly.

Missing data. Analysis revealed that no measure had more than 5% missing data. The highest level of missing data was for family SES (4.8%). The dependent variable (SMFQ scores) had a total of 3.5% missing data. The independent variable (recent alcohol consumption) had 0.8% missing data. Participants with any missing data were excluded from the main analysis (\( n = 492; 17.35\% \)). Little’s MCAR test was significant (\( \chi^2 = 1312.08, \text{df} = 1116, p < .001 \)), indicating that data was not missing completely at random.

Normality. As the sample size was 2,884 and considered large it could be reasonably assumed that the assumption of normality was met (Tabachnick & Fidel, 2013).

Multicollinearity. Variance Inflation Factor (VIF), Tolerance scores (1/VIF) and Pearson correlation coefficient were used to examine for multicollinearity among all predictor variables in the study. VIF scores ranged from 1.05 to 1.29, and Tolerance scores ranged from 0.78 to 0.96. All VIF and Tolerance scores were within acceptable ranges (Cohen et al., 2003). Table 17 below displays the correlation matrix between all continuous predictor variables in the current study. The highest correlation between any two variables
was .69, which was between age and pubertal stage. All correlations were within acceptable ranges and do not violate that assumption of multicollinearity (Tabachnick & Fidel, 2013).
Table 17

Pearson Correlation Coefficients between Continuous Predictor Variables in Study 2

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Note. 1 = Age; 2 = Alcohol consumption; 3 = Pubertal stage; 4 = Self-esteem; 5 = Bullying; 6 = Academic failure; 7 = Family conflict; 8 = Poor family management; 9 = Family attachment; 11 = Community disorganisation; 12 = Low neighbourhood attachment.
**Descriptive Statistics**

After data screening, the final sample comprised 2,835 students. The sample comprised approximately equal numbers of males (48%) and females (52%) with an overall mean age of 12.95 ($SD = 1.64$). At Time 2, the mean age was 11.44 years ($SD = 0.53$) in the youngest cohort, 13.45 years ($SD = 0.54$) in the middle cohort, and 15.40 years ($SD = 0.51$) in the oldest cohort. Approximately half the sample resided in urban areas (54.57%) and the remainder in either rural (27.76%) or large/small towns (17.67%). The descriptive statistics of all categorical and continuous variables in the current study are presented in Table 18.
Table 18

Descriptive Statistics of Categorical and Continuous Variables in Study 2

<table>
<thead>
<tr>
<th>Variables in study</th>
<th>Frequency</th>
<th>$n$ (%)</th>
<th>$n$ (%) missing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Categorical</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (male)</td>
<td>1358</td>
<td>47.90</td>
<td>2835 (0.00)</td>
</tr>
<tr>
<td>Cigarette past 30 days (yes)</td>
<td>861</td>
<td>30.94</td>
<td>2783 (1.83)</td>
</tr>
<tr>
<td>Marijuana past 30 days (yes)</td>
<td>189</td>
<td>6.72</td>
<td>2814 (0.74)</td>
</tr>
<tr>
<td><strong>Continuous</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMFQ scores (Time 2)</td>
<td>0 – 26</td>
<td>6.93</td>
<td>2736 (3.49)</td>
</tr>
<tr>
<td>SMFQ scores (Time 1)</td>
<td>0 - 26</td>
<td>7.00</td>
<td>2728 (3.77)</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>1 - 3</td>
<td>1.51</td>
<td>2810 (0.88)</td>
</tr>
<tr>
<td>Age</td>
<td>9 - 16</td>
<td>12.45</td>
<td>2835 (0.00)</td>
</tr>
<tr>
<td>Pubertal stage</td>
<td>1-4</td>
<td>2.38</td>
<td>2768 (2.36)</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>1 - 3</td>
<td>2.32</td>
<td>2809 (0.92)</td>
</tr>
<tr>
<td>Bullying</td>
<td>1 - 4</td>
<td>1.73</td>
<td>2789 (1.62)</td>
</tr>
<tr>
<td>Academic failure</td>
<td>1 - 4</td>
<td>1.95</td>
<td>2772 (2.22)</td>
</tr>
<tr>
<td>Family conflict</td>
<td>1 - 4</td>
<td>2.18</td>
<td>2790 (1.59)</td>
</tr>
<tr>
<td>Poor family management</td>
<td>1 - 4</td>
<td>1.63</td>
<td>2803 (1.13)</td>
</tr>
<tr>
<td>Family attachment</td>
<td>1 - 4</td>
<td>3.13</td>
<td>2795 (1.41)</td>
</tr>
<tr>
<td>CD</td>
<td>1 - 4</td>
<td>1.45</td>
<td>2776 (2.08)</td>
</tr>
<tr>
<td>LNA</td>
<td>1 – 4</td>
<td>1.79</td>
<td>2777 (2.05)</td>
</tr>
</tbody>
</table>

Note. CD = Community disorganisation; LNA = Low neighbourhood attachment. All variables were measured at Time 1, unless specified otherwise.

Over a one-year period, the rate of clinically significant depressive symptoms (scores $> 11$) across the whole sample rose from 18.48% (Time 1) to 20.14% (Time 2). At Time 2, the mean SMFQ score was 6.93 ($SD = 6.03$). Overall, females ($M = 7.92$, $SD = 6.34$) had significantly higher mean SMFQ scores than males ($M = 5.86$, $SD = 5.07$), $t(2734) = -9.09$, $p$
A one-way ANOVA with post hoc comparisons using Bonferroni correction indicated that the youngest cohort ($M = 5.72$, $SD = 5.46$) had significantly lower mean SMFQ scores at Time 2 ($F(2, 2733) = 23.44$, $p < 0.001$) compared to the middle ($M = 7.48$, $SD = 6.33$) and oldest ($M = 7.52$, $SD = 6.07$) cohorts. There were no significant differences between mean SMFQ scores at Time 2 between the middle and oldest cohorts.

Table 19 outlines the SMFQ scores by cohort and wave. Overall, females (25.98%) reported significantly higher levels of clinically significant depressive symptoms compared to males (13.76%), $t(2734) = -8.05$, $p < 0.001$. For both sexes, depressive symptoms peaked in Year 8 (middle cohort). For males, however, after Year 8 depressive symptoms decreased slightly in Years 9 and 10 (oldest cohort). Whereas for females, depressive symptoms remained relatively high and stable in Years 9 and 10. In Years 5 and 6, the rate of clinically significant depressive symptoms was slightly higher in females compared to males. After symptoms peaked in Year 8, however, females were almost three times more likely to report clinically significant depressive symptoms than males.
Table 19

*Percentage of Adolescents with Clinically Significant Depressive Symptoms and Frequency of Alcohol Use by Sex, Cohort and Time*

<table>
<thead>
<tr>
<th></th>
<th>Youngest cohort</th>
<th>Middle cohort</th>
<th>Oldest cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time 1</td>
<td>Time 2</td>
<td>Time 1</td>
</tr>
<tr>
<td>Year 5</td>
<td>M 436</td>
<td>F 480</td>
<td>M 436</td>
</tr>
<tr>
<td>Year 6</td>
<td>M 466</td>
<td>F 492</td>
<td>M 492</td>
</tr>
<tr>
<td>Year 7</td>
<td>M 436</td>
<td>F 466</td>
<td>M 492</td>
</tr>
<tr>
<td>Year 8</td>
<td>M 466</td>
<td>F 492</td>
<td>M 492</td>
</tr>
<tr>
<td>Year 9</td>
<td>M 466</td>
<td>F 492</td>
<td>M 492</td>
</tr>
<tr>
<td>Year 10</td>
<td>M 456</td>
<td>F 505</td>
<td>M 456</td>
</tr>
</tbody>
</table>

**SMFQ**

- Scores > 11
  - M 5.53% 7.56% 6.39% 6.98% 11.88% 7.61% 16.52% 6.81% 16.43% 5.74% 16.28%

**Past 30 days alcohol use**

- Never
  - M 65.90% 77.26% - - 63.77% 74.03% - - 44.80% 47.00% - -
  - F 77.26% - - - - - - - 77.26% - - - -
- 1 - 2 times
  - M 19.00% 17.65% - - 24.30% 19.00% - - 30.46% 35.80% - -
  - F 17.65% - - - - - - - 17.65% - - - -
- 3+ times
  - M 15.08% 5.68% - - 11.93% 6.94% - - 24.72% 17.20% - -
  - F 5.68% - - - - - - - 5.68% - - - -

*Note. M = males; F = females.*
Table 19 above also outlines reported levels of alcohol consumption. The prevalence of alcohol consumption over the last 30 days increased with age, with the exception of males in the youngest cohort, where a greater proportion reported consuming alcohol (i.e. three or more times) at a rate greater than males in the middle cohort. Overall, males reported more regular alcohol consumption during the last 30 days compared to females, \( t(2808) = 5.55, p < 0.001 \). Approximately 20% of participants in Year 9 (oldest cohort) reported consuming alcohol three or more times in the last 30 days.

**Main Data Analyses**

In this section, analyses addressed this study’s research questions and hypotheses. Table 20 below presents the significant variables retained in each step of the MLM process for the non-linear model, which was the model with the most explanatory power, as non-linear effects were identified. In Model 1, with only the alcohol variables in the model, both alcohol consumption (\( \beta = 4.19 \)) and alcohol consumption squared (\( \beta = -0.89 \)) were significant predictors of depressive symptoms at Time 2. The change in the 2Log Likelihood statistic indicated that Model 1 was a significantly better fit compared to the null model, \( \chi^2 (5, N = 2343) = 32.05, p < .001 \). Model 1 reduced the variance between schools by approximately 15% \( [(2.13 - 1.82) / 2.13] \).
Table 20

Non-Linear Multilevel Model Predicting Depressive Symptoms at Time 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Null</th>
<th>Coef (95% CI)</th>
<th>p</th>
<th>Coef (95% CI)</th>
<th>p</th>
<th>Coef (95% CI)</th>
<th>p</th>
<th>Coef (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol consumption</td>
<td></td>
<td>4.19 (1.91, 6.46)</td>
<td>0.000</td>
<td>3.01 (0.93, 5.10)</td>
<td>0.005</td>
<td>2.86 (0.84, 4.89)</td>
<td>0.006</td>
<td>2.83 (0.81, 4.86)</td>
<td>0.006</td>
</tr>
<tr>
<td>Alcohol consumption²</td>
<td></td>
<td>-0.89 (-1.48, -0.29)</td>
<td>0.004</td>
<td>-0.70 (-1.25, -0.16)</td>
<td>0.011</td>
<td>-0.66 (-1.20, -0.14)</td>
<td>0.014</td>
<td>-0.65 (-1.18, -0.13)</td>
<td>0.015</td>
</tr>
<tr>
<td>Baseline symptoms</td>
<td></td>
<td>0.54 (0.49, 0.59)</td>
<td>0.000</td>
<td>0.52 (0.47, 0.57)</td>
<td>0.000</td>
<td>0.52 (0.47, 0.57)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td>1.58 (1.12, 2.04)</td>
<td>0.000</td>
<td>1.63 (1.18, 2.08)</td>
<td>0.000</td>
<td>1.63 (1.19, 2.08)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bullying</td>
<td></td>
<td>1.30 (1.07, 1.53)</td>
<td>0.000</td>
<td>1.14 (0.91, 1.37)</td>
<td>0.000</td>
<td>1.13 (0.90, 1.35)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pubertal stage</td>
<td></td>
<td>0.91 (0.56, 1.26)</td>
<td>0.000</td>
<td>0.69 (0.35, 1.02)</td>
<td>0.000</td>
<td>0.67 (0.34, 1.00)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-esteem</td>
<td></td>
<td>-3.21 (-3.69, -2.74)</td>
<td>0.000</td>
<td>-2.56 (-3.04, -2.08)</td>
<td>0.000</td>
<td>-2.53 (-3.01, -2.05)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarette use</td>
<td></td>
<td>0.84 (0.29, 1.39)</td>
<td>0.003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family conflict</td>
<td></td>
<td></td>
<td></td>
<td>1.26 (0.97, 1.55)</td>
<td>0.000</td>
<td>1.26 (0.96, 1.55)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family attachment</td>
<td></td>
<td></td>
<td></td>
<td>-0.85 (-1.21, -0.49)</td>
<td>0.000</td>
<td>-0.81 (-1.18, -0.46)</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N1 (individuals)</td>
<td></td>
<td>2343</td>
<td></td>
<td>2343</td>
<td></td>
<td>2343</td>
<td></td>
<td>2343</td>
<td></td>
</tr>
<tr>
<td>N2 (schools)</td>
<td></td>
<td>154</td>
<td></td>
<td>154</td>
<td></td>
<td>154</td>
<td></td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>σ² between (schools)</td>
<td></td>
<td>2.13</td>
<td></td>
<td>1.82</td>
<td></td>
<td>0.49</td>
<td></td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td>df</td>
<td></td>
<td>3</td>
<td></td>
<td>5</td>
<td></td>
<td>10</td>
<td></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>-LL</td>
<td></td>
<td>7502.38</td>
<td></td>
<td>7486.36</td>
<td></td>
<td>7257.78</td>
<td></td>
<td>7201.61</td>
<td></td>
</tr>
<tr>
<td>AIC</td>
<td></td>
<td>15010.77</td>
<td></td>
<td>14982.72</td>
<td></td>
<td>14593.56</td>
<td></td>
<td>14425.21</td>
<td></td>
</tr>
<tr>
<td>BIC</td>
<td></td>
<td>15028.04</td>
<td></td>
<td>15011.52</td>
<td></td>
<td>14593.15</td>
<td></td>
<td>14488.57</td>
<td></td>
</tr>
</tbody>
</table>

Note. Coef = coefficient; CI = confidence interval; Alcohol use² = last 30 days alcohol use squared; σ² between = variance between schools; df = degrees of freedom; -LL = negative log likelihood statistic; AIC = Akaike Information Criteria statistic; BIC = Bayesian Information Criteria statistic.
In Model 2, with individual-level risk factors in the model, alcohol consumption (β = 3.01), alcohol consumption squared (β = -0.70) and biological sex (β = 1.58) were significant predictors of depressive symptoms at Time 2. Age (β = 3.01, \( p = 0.773 \)) was not a significant predictor, and was therefore removed from the model. The change in the 2Log Likelihood statistic indicated that Model 2 was a better fitting model compared to the Model 1, \( \chi^2 (10, N = 2343) = 457.16, \ p < .001 \). Model 2 explained approximately 77\% \([2.13 - 0.49) / 2.13]\) of the variance between schools compared with the null model.

In Model 3, with family-level risk factors in the model, alcohol consumption (β = 2.86), alcohol consumption squared (β = -0.66) and sex (β = 1.63) remained significant predictors of depressive symptoms at Time 2. The change in the 2Log Likelihood statistic indicated that Model 3 was a significantly better fit compared to Model 2, \( \chi^2 (11, N = 2343) = 112.34, \ p < .001 \). Model 3 explained approximately 80\% \([2.13 - 0.42) / 2.13\] of the variance between schools compared with the null model.

In Model 4, with community-level risk factors in the model, alcohol consumption (β = 2.83), alcohol consumption squared (β = -0.65) and sex (β = 1.63) were significant predictors of depressive symptoms at Time 2. No significant interactions between alcohol consumption and age, or alcohol consumption and sex were identified. The change in the 2Log Likelihood statistic indicated that Model 4 was a significant improvement to Model 3, \( \chi^2 (12, N = 2343) = 3.97, \ p = .046 \). The final model accounted for approximately 84\% of the variance in depressive symptoms between schools. Comparing the final model with and without alcohol variables indicated that the quadratic count of alcohol consumption explained approximately 4\% of the variance. A Hausman test indicated that for the final model, the within-group (LGA) variance was heterogeneous between LGAs, \( \chi^2 (12, N = 2343) = 19.11, \ p = 0.089 \).
The final model suggested that after controlling for baseline depressive symptoms and risk factors, alcohol consumption at Time 1 was a significant predictor of depressive symptoms one year later. As alcohol consumption was modelled as a quadratic, however, it suggested this relationship was non-linear. To aid interpretation, predicted probabilities were produced. Figure 5 plots the predicted probabilities for the final model by sex.

Figure 5. Predicted SMFQ scores at Time 2 as indicated by the number of drinking occasions in the past month at Time 1 for males (a) and females (b), while controlling for all variables retained in the final model (Model 4).
Table 21

*Predicted SMFQ Scores at Time 2 as Indicated by the Number of Drinking Occasions in the Past Month at Time 1, while Controlling for all Variables Retained in Model 4*

<table>
<thead>
<tr>
<th>Number of drinking occasions in the past month at Time 1</th>
<th>Predicted SMFQ scores at Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
</tr>
<tr>
<td>None</td>
<td>5.35</td>
</tr>
<tr>
<td>1 to 2</td>
<td>6.48</td>
</tr>
<tr>
<td>3 or more</td>
<td>6.76</td>
</tr>
</tbody>
</table>

Figure 5 and Table 21 above suggest that the association between non-clinical levels of alcohol consumption and depressive symptoms is non-linear for males and females. Thus, the increases in depressive symptoms at Time 2 was not even between changes in frequency at Time 1. For males, the change in frequency between ‘none’ and ‘1 to 2 times’ was 1.13 units. Whereas, this decreased to 0.28 units for the change in frequency between ‘1 to 2 times’ to ‘3 or more times’. For females, the change in frequency between ‘none’ and ‘1 to 2 times’ was 2.17 units. Whereas, this decreased to 0.45 units for the change in frequency between ‘1 to 2 times’ to ‘3 or more times’. Overall, the temporal changes in frequency of depressive symptoms at Time 2 with increasing levels of alcohol consumption one year earlier (Time 1) followed a curvilinear pattern for both sexes, however, the changes in SMFQ scores was higher on average among females.

**Discussion**

Using two waves of data from the IYDS, this study examined a temporal association between non-clinical alcohol consumption as a predictor of depressive symptoms in a sample
of late primary school and early secondary school students. The first hypothesis, that non-clinical alcohol consumption would be a significant predictor of depressive symptoms one year later, after adjusting for baseline depressive symptoms and other risk factors, was supported. The second hypothesis, that the association between alcohol consumption as a predictor of depressive symptoms would be non-linear, was supported. The results suggested a curvilinear association, where increases in depressive symptoms plateaued with further increases in the frequency of consumption at Time 1. The third hypothesis, that younger drinkers would be at greater risk for depression compared to older drinkers, was not supported. The current study also did not identify significant differences in the association across sexes. Overall, the findings of this study suggest that the development of co-occurring alcohol consumption and depressive symptoms may be non-linear. Identifying the shape of the developmental trajectory carries important implications for prevention efforts that target early adolescent drinking.

In the current study, approximately 20% of adolescents reported clinically significant levels of depressive symptoms at Time 2. The percentage of scores above the clinical cut-off score was higher than prevalence estimates of MDD in adolescence, which ranges from 7% to 10% (Costello et al., 2003; Lawrence et al., 2015; SAMHSA, 2014). However, this was expected, as the SMFQ is a relatively brief screening tool, not a clinical diagnostic tool. Thus, the prevalence estimates in the current study will include participants with sub-clinical depressive symptoms that would not meet full diagnostic criteria for a depressive disorder.

Consistent with national (Lawrence et al., 2015) and international (SAMHSA, 2014) epidemiological data, females were more likely to report clinically significant depressive symptoms than males. Sex differences in depressive symptoms emerged in early secondary school, peaking in Year 8 when females were more than twice as likely to report clinically significant depressive symptoms than males. This is consistent with previous research that
indicates sex differences in the prevalence of depressive symptoms emerges between the ages of 12 to 14 (Ge et al., 2001; Wade et al., 2002).

Similarly, the results of the current study were consistent with epidemiological data that indicates that the rate of depression increases steadily with increasing age for females (Lawrence et al., 2015; SAMHSA, 2014). In the current study, the rate of clinically significant depressive symptoms rose steadily from approximately 7% in Year 5 to 16% in Year 10. Results for males were also consistent with epidemiological data, which suggests that from early secondary school the rates of depressive symptoms remain relatively stable across adolescence (Twenge & Nolen-Hoeksema, 2002). Overall, the patterns in the prevalence of depressive symptoms in the current study suggest the findings in this study may be generalisable to other samples.

In regards to alcohol consumption, 51% of participants in Grade 5 had tried alcohol at least once in their lifetime. This rose to 59% in the middle cohort and 82% in the oldest cohort. These results were consistent with Australian epidemiological data (White & Bariola, 2012). The rates of consumption over the past month were lower, with 31% in the middle cohort and 54% in the oldest cohort consuming alcohol in the past 30 days. Due to developmental differences, such as lower consumption rates in primary school aged students, past month consumption was not measured in the youngest cohort. In the current study, past 30 days alcohol consumption was higher compared to Australian epidemiological data (White & Bariola, 2012). This discrepancy may limit the generalisability of results in the current study. However, the patterns of consumption across age and sex were comparable to Australian epidemiological data (White & Bariola, 2012). Overall, alcohol consumption tended to increase with age and rates of consumption were similar across sexes. Males were, however, more likely to consume alcohol three or more times in the past month than females.
Hypothesis 1 and Hypothesis 2

The current study found support for the hypothesis that consuming alcohol at Time 1 increased the risk of depressive symptoms one year later, after adjusting for baseline depressive symptoms and other risk factors. The results, however, suggested a curvilinear association, which supports the hypothesis that the shape of the association between non-clinical levels of alcohol consumption and depressive symptoms will follow a non-linear pattern. The increases in depressive symptoms was not even between changes in drinking frequency at Time 1. Plotting the association revealed a curvilinear association characterised by a steeper increase in depressive symptoms between ‘none’ and ‘1 to 2 times’ at Time 1, compared to further increases in drinking frequency. While there was still an increase in depressive symptoms from ‘1 to 2 times’ to ‘3 or more times’, the increase was smaller and suggested this effect may begin to plateau after an initial increase in depressive symptoms. For both males and females, the association between alcohol consumption as a predictor of depressive symptoms followed a curvilinear pattern; however, the changes in depressive symptoms was higher on average among females. Overall, these results suggest that early alcohol consumption increases the risk of depressive symptoms in a non-linear fashion.

The finding that early alcohol consumption increases the risk of later depressive symptoms in adolescents is consistent with past longitudinal studies. The current study’s findings are consistent with previous longitudinal studies that showed that higher levels of lifetime alcohol consumption frequency (Rodriguez et al., 2005) increased the risk of later depressive symptoms. The current study’s results were also consistent with studies that had examined the association with heavier patterns of alcohol consumption in mid- to late adolescence (Edwards et al., 2014a; Fleming et al., 2008; Marmorstein, 2009; Skogen et al., 2016). These studies identified that heavier patterns of alcohol consumption were associated with an increased risk of depression in mid- to late adolescence.
This finding, however, is inconsistent with some previous longitudinal studies. In a Canadian sample of adolescents, frequency and quantity of alcohol consumption in Year 9 did not predict depressive symptoms in late adolescence (Hooshmand et al., 2012). This inconsistent result may be due to the relatively low rates of alcohol consumption identified in the previous studies sample. The results of the current study are also inconsistent with findings from the Christchurch Health Development Study (Newton-Howes & Boden, 2016). This previous study found that earlier age of first drink (prior to age 14) did not predict MDD between the ages of 15 to 17 years. In alcohol prevention research, the validity and reliability of ‘age of first drink’ measure has recently been questioned as to whether it is a reliable indicator of drinking behaviour (Kuntsche et al., 2016). The use of ‘age of first drink’ as a measure of drinking behaviour may fail to capture any true associations that exist between alcohol consumption and depressive symptoms. However, age of first drunkenness may be a more reliable indicator of future drinking behaviour and associated problems (Kuntsche et al., 2016). Risker patterns of alcohol consumption (i.e intoxication) may be more strongly associated with depressive symptoms compared to the age one first consumes alcohol.

The current study adds to the extant literature by demonstrating that engaging in occasional alcohol use (one to two times) is associated with an increase in depressive symptoms one year later in early to mid-adolescents. The findings, however, showed that this association was at sub-clinical levels of depressive symptoms. This might suggest that the co-occurrence between alcohol consumption and depressive symptoms may have its origins in early adolescence, when one is beginning to experiment with alcohol. Increases in depressive symptoms at sub-clinical levels carries important implications for prevention, as sub-clinical adolescent mental health problems are associated with impairment in functioning that may lead to poorer developmental outcomes (Allen et al., 2014; Costello et al., 2003; Lewinsohn et al., 2004). Sub-clinical mental health problems also increase the risk of later mental health
problems in adulthood (Angst et al., 2000; Pine et al., 1999). Therefore, implementing prevention strategies in this developmental period could be important for the prevention of mental health problems in later years.

The strength of the temporal association after adjusting for baseline depressive symptoms and a wide range of other risk factors provides some support for the reverse hypothesis (Marmorstein, 2009). To recap, the reverse hypothesis postulates that alcohol consumption may increase the risk of developing depressive symptoms (Marmorstein, 2009). While the association between alcohol consumption and depressive symptoms is undoubtedly complex, the current study provides some evidence that alcohol consumption precedes depressive symptoms as one developmental pathway that contributes to the high rate of co-occurrence that appears to begin in adolescence. One possible reason for this could be that experimenting with alcohol in early to mid-adolescence may lead to neurobiological changes in the developing brain that increase one’s susceptibility to depressive symptoms (Brown & Tapert, 2004; Spear, 2000; Spear, 2005). Alternatively, alcohol consumption during early adolescence may be associated with negative social consequences that increase one’s vulnerability to experiencing depressed mood and associated symptoms.

The current study also revealed subtle differences in the shape of the association between males and females. Occasional alcohol consumption at Time 1 was associated with a steeper increase in depressive symptoms for females compared to males. This result is consistent with past research that has identified alcohol consumption is a stronger predictor of depressive symptoms in females compared to males (Marmorstein, 2009; Owens et al., 2008; Yue et al., 2015). This might suggest that female drinkers in early to mid-adolescence are more prone to depressive symptoms than males. The association may be stronger in females because females are at increased risk of internalising disorders such as depression (Ge et al.,
whereas, males are more likely to experience externalising disorders (Lawrence et al., 2015).

In addition to this finding, the current study also adds to the extant literature by identifying that the shape of this association follows a non-linear pattern. Findings suggested that as drinking increases depressive symptoms increase; however, this effect may begin to plateau with more frequent consumption. Previous longitudinal evidence suggests that increases in depressive affect over time are non-linearly associated with drinking frequency (Owens et al., 2008). Among low-level drinkers at baseline, increases in depressive affect became increasingly larger over time (Owens et al., 2008). While the findings of the current study are in line with previous evidence, suggesting that a non-linear association may exist, information regarding changes in the association over time are limited due to the use of two waves of data.

There are several possible explanations that may explain the curvilinear association identified. First, the different timings in cognitive and social-emotional developments in adolescence may influence the association between alcohol consumption and depressive symptoms. Adolescents experience an increase in novelty seeking associated with changes in their dopaminergic system, while their self-regulatory system continues to develop (Steinberg, 2010). Evidence suggests that high novelty seeking is more closely linked with drinking behaviours, whereas high levels of self-control are associated with an increased risk for depression in adolescents (Willoughby & Fortner, 2015). The different timings in development may contribute to the non-linear association, such that increases in alcohol consumption do not lead to the same incremental changes in depressive symptoms.

Second, there may be a threshold beyond which further increases in alcohol consumption do not increase the risk of depressive symptoms. Maybe at higher levels of
alcohol consumption, other risk factors are stronger predictors of depressive symptoms. For example, adolescents engaging in more regular alcohol consumption may experience higher levels of family conflict, which act as a stronger predictor of depressive symptoms. Likewise, adolescents engaging in more regular alcohol consumption may also experience academic failure and social consequences that increase their risk for depression. Thus, at higher levels of consumption the association between alcohol consumption and depression may be mediated by other risk factors that may be either precursors or consequences of heavier alcohol consumption. Third, the association between more frequent alcohol consumption and depressive symptoms may be moderated by other factors that promote wellbeing and mental health. For example, adolescents engaging in more frequent alcohol consumption may experience stronger social connections with their peers; thus, protective benefits of these social interactions have a positive effect on mental health.

**Hypothesis 3**

Unlike Study 1, the current study did not find support for the hypothesis that alcohol consumption would be a stronger predictor of depressive symptoms in younger adolescents. This finding is inconsistent with previous research which suggests that younger adolescent drinkers are at greater risk for depressive symptoms than drinkers in late adolescence (Marmorstein, 2009; Skogen et al., 2014; Verdurmen et al., 2005). Of these studies, only one was of a longitudinal design (Marmorstein, 2009) and had examined the temporal nature of this association over six years in comparison to one year in the current study. Longitudinal studies of longer duration are likely to be able to better detect the effects of age and developmental changes when examined over time. In addition, perhaps the current study did not identify an age interaction as participants recruited in this study were in pre-adolescence to mid-adolescence developmental stage. Thus, the current study did not include teenagers in
late adolescence, a developmental period that may be less sensitive to the mental health effects of non-clinical levels of alcohol consumption.

**Limitations**

While this study provides longitudinal evidence of alcohol consumption as a predictor of depressive symptoms and is one of the first studies to examine non-linear associations, this study has several limitations. One limitation is the measurement of alcohol consumption, which differed between the youngest and middle/oldest cohorts due to developmental differences. As only lifetime alcohol consumption was assessed in the youngest cohort, responses from the middle and oldest cohorts regarding frequency of consumption over the past month were condensed to create one alcohol consumption variable for the MLM. Therefore, valuable information in regards to the nature of the association over more frequent drinking patterns was lost. The current study indicates the association between alcohol consumption and depressive symptoms begins to plateau when consumption reaches three to five times per month; however, this study was unable to examine this association with more frequent monthly consumption. More frequent and heavier drinking patterns may be associated with depressive symptoms at clinical levels.

Furthermore, the current study focused on examining the association between non-clinical alcohol consumption as a risk factor for depressive symptoms in adolescents. However, this study included participants who may have engaged in heavier and risky drinking patterns in the past month. Therefore, this study cannot determine whether non-clinical patterns of alcohol consumption are directly linked to increases in depressive symptoms, as heavier drinking patterns may account for this effect.

While this study controlled for a wide range of confounding factors, it did not control for perception of self as overweight (Bazargan-Hejazi et al., 2010), child maltreatment
(Fergusson & Lynskey, 1997; Frederico, Jackson, & Black, 2008) or parental depression (Goodman et al., 2011), which are strong predictors of depressive symptoms in adolescence. Also, the results of the current study may not be generalisable to high risk adolescents who had dropped out of school or missed school as they were likely to be underrepresented in the current study. Prior research indicates these adolescents often experience high rates of substance use and mental health problems, and it is possible the association between these variables follows a different pattern to the normative adolescent population.

**Conclusion and Future Directions**

Overall, this study has provided evidence in support of the reverse hypothesis. It has demonstrated that alcohol consumption did predict depressive symptoms one year later in early to mid-adolescence. This study has also provided evidence of a non-linear association between alcohol consumption as a risk factor for sub-clinical depressive symptoms, with increases in depressive symptoms beginning to plateau at three or more recent drinking occasions. A non-linear association between alcohol consumption and depressive symptoms may be linked with developmental changes in adolescence. From a prevention perspective, the current study suggests that normative alcohol consumption may be linked with the prevention of sub-clinical mental health problems in adolescence.

The aforementioned limitations of the current study provide a basis for future research directions. Longitudinal studies of greater duration and with more than two waves of data are needed to further examine non-linear associations that may be linked with age-related developmental changes in adolescents. Studies examining non-linear associations should include measures of more frequent and heavier patterns of alcohol consumption that may be linked with clinical levels of depressive symptoms. Future research could also investigate possible three-way interaction effects between alcohol consumption, age and sex. Differences in the association between males and females may vary by age and drinking patterns.
Chapter 8: General Discussion and Conclusion

Chapter Overview

This chapter provides an integrated summary and discussion of the entire thesis. To avoid repetition, only the key findings will be discussed in this chapter. This chapter begins by summarising the key findings within the literature from the earlier chapters. It then presents the key findings, which are presented according to the three primary research questions within this thesis. This chapter then discusses the clinical implications and strengths and limitations of the thesis. It concludes with suggestions for future research directions.

Summary of Key Findings in the Literature

This thesis began by outlining epidemiological evidence that demonstrates a high rate of co-occurring alcohol consumption and depression in adolescence (Kandel et al., 1999; Salom et al., 2016). There have been a number of hypotheses postulated to explain the co-occurrence between alcohol consumption and depression. Of these hypotheses, the self-medication hypothesis, that depression increases alcohol consumption, has received the most attention (Khantzian, 1990, 1997). There has been mixed support for the self-medication hypothesis in adolescence and early adulthood, with a number of studies demonstrating evidence against this hypothesis (Fergusson et al., 2009; Kumpulainen & Roine, 2002; Merikangas et al., 1998). More recently, there has been an increase in the number of studies
examining the reverse hypothesis. This hypothesis posits that alcohol consumption may increase the risk of developing depression (Marmorstein, 2009). Emerging evidence provides support for alcohol consumption as a risk factor for depression in adolescents (Edwards et al., 2014a; Fleming et al., 2008; Marmorstein, 2009; Owens et al., 2008; Skogen et al., 2016). However, much about this relationship remains unanswered. This thesis more deeply examined the relationship between non-clinical alcohol consumption as a predictor of psychological distress and depressive symptoms in adolescents.

Chapter 4 presented a literature review of studies that had examined the reverse hypothesis in adolescence. Eighteen studies were identified, nine cross-sectional and nine longitudinal studies. Overall, the evidence base provided preliminary support for the reverse hypothesis, demonstrating alcohol consumption was a significant predictor of depressive symptoms in adolescence, across a range of alcohol measures. One cross-sectional (Verdurmen et al., 2005) and one longitudinal study (Marmorstein, 2009) identified moderating effects of age, suggesting that heavy alcohol consumption was a stronger predictor of depressive symptoms in younger adolescents relative to older adolescents. The review identified one cross-sectional (Skogen et al., 2014) and one longitudinal study (Owens et al., 2008) that had examined non-linear associations. Only the longitudinal study identified non-linear effects, suggesting that among low-level drinkers at baseline, increases in depressive affect was not even between changes in drinking frequency, with increases in depressive affect becoming increasingly larger over time (Owens et al., 2008). The evidence was mixed in regards to whether sex moderated the association, with no clear patterns emerging.

While the evidence base indicated that alcohol consumption is associated with an increased risk of developing depression in adolescence, much about this relationship remains unanswered. Information relating to the shape of the association, and potential mediating
effects of age and biological sex, carry important clinical implications for prevention and early intervention work. The current thesis aimed to address the gaps within the extant literature with two empirical studies, the first cross-sectional and the second longitudinal. The two studies posed similar research questions, with the second study building on the first with its longitudinal design and capacity to examine the temporal nature of the association. The discussion of the key findings from Study 1 and Study 2 will be structured around the thesis research questions (RQ). It will outline how the collective evidence from these studies answers the three primary research questions addressed in both studies:

RQ1: Is the cross-sectional and longitudinal association between non-clinical alcohol consumption as a predictor of psychological distress and depressive symptoms non-linear?

RQ2: Is the association between non-clinical alcohol consumption as a predictor of psychological distress and depressive symptoms moderated by age?

RQ3: Is the association between non-clinical alcohol consumption as a predictor of psychological distress and depressive symptoms moderated by biological sex?

Key Findings

The first study used a representative sample of Australian adolescents from the state of Victoria. It specifically examined the association between non-clinical levels of alcohol consumption as a predictor of psychological distress, a construct closely related to depression. In keeping with the theory and current evidence, linear and non-linear associations in the relationship between these two variables were also examined. In Study 1, the rates of psychological distress and alcohol consumption were consistent with national and international data, with both more common in older adolescents as expected, suggesting that current findings may be generalisable to other samples.
Building on Study 1, Study 2 employed a longitudinal design to examine the temporal nature of the association between non-clinical alcohol consumption as a risk factor for depressive symptoms. It used a representative sample of Australian adolescents from the state of Victoria. Specifically, it examined linear and non-linear associations between non-clinical levels of alcohol consumption as a predictor of depressive symptoms one year later in a sample of pre- to mid-adolescents. It also examined whether the association was moderated by age and biological sex. As in Study 1, and as expected, the rates of depressive symptoms and alcohol consumption in Study 2 increased with age. This suggested the current findings may be generalisable to other samples.

RQ1. Study 1 identified no non-linear effects. This was consistent with previous cross-sectional evidence and collectively suggests that non-linear associations are best identified by longitudinal studies. Perhaps a non-linear relationship between alcohol consumption and depressive symptoms is related to developmental changes over time that are identified across multiple waves of data.

As expected, Study 2 identified a non-linear association between alcohol consumption as a predictor of depressive symptoms one year later after adjusting for baseline depressive symptoms and other risk factors. Plotting the association showed a curvilinear relationship between alcohol consumption at Time 1 and depressive symptoms one year later. Increases in depressive symptoms at Time 2 were not even between changes in drinking frequency at Time 1. There was a steeper increase in depressive symptoms from no drinking occasions to one or two drinking occasions. At three or more drinking occasions, the increase in depressive symptoms began to plateau. Overall, there was a curvilinear association between alcohol consumption at Time 1 and depressive symptoms at Time 2 for both sexes; however, the changes in scores were higher on average among females.
There are a number of possible explanations for the non-linear association between alcohol consumption as a predictor of depressive symptoms. One explanation may be the different timings in the development of novelty seeking and self-regulatory capacities. Such developmental changes may contribute to non-linear associations; thus, that alcohol consumption does not lead to the same incremental changes in depressive symptoms. Another possible explanation may be that there is a threshold beyond which further increases in alcohol consumption are not linearly associated with further increases in the risk for depressive symptoms. Possibly alcohol initiation may be linked to increases in depressive symptoms, whereas further increases in alcohol consumption may be linked with self-medicating effects. Thus, further alcohol consumption may mask symptoms of depression and may be used as a short-term coping strategy. If both the reverse hypothesis and the self-medicating hypothesis hold true, but at different levels of consumption, this may at least partially contribute to the mixed findings within the literature.

Alternatively, the association between more frequent alcohol consumption and depressive symptoms may be moderated by other factors that promote wellbeing and mental health. For example, adolescents engaging in more frequent alcohol consumption may experience stronger social connections with their peers; thus, protective benefits of these social interactions might protect against some of the adverse consequences associated with alcohol consumption.

**RQ2.** Study 1 identified a significant interaction between age and alcohol consumption on psychological distress in adolescents. Elasticity effects showed that non-clinical alcohol consumption was a stronger predictor of psychological distress in younger adolescents, with the effect declining with age. At age 11, the odds of very high levels of psychological distress was 84% higher in adolescents who had recently consumed alcohol compared to non-drinkers. At ages 16 to 17, the odds of psychological distress in drinkers
compared to non-drinkers decreased to 14% and 4%, respectively. This finding suggests that in early adolescence, non-clinical alcohol consumption may be a strong predictor of psychological distress; however, in late adolescence other risk factors are stronger predictors of psychological distress than non-clinical alcohol consumption.

Unlike Study 1, the second study did not support the hypothesis that alcohol consumption would be a stronger risk factor for depressive symptoms in younger adolescents. While alcohol consumption was identified as a significant predictor of depressive symptoms one year later after controlling for baseline depressive symptoms, the effect was not stronger in younger adolescents as expected. In Study 1, the odds of psychological distress among drinkers compared to non-drinkers decreased the most in late adolescence. Therefore, as Study 2 had a one-year follow-up period and participants were not sampled in late adolescence, this study may not have detected an interaction between alcohol consumption and age.

RQ3. The results of both studies suggested the association between alcohol consumption as a predictor of psychological distress and depressive symptoms was not found to be moderated by biological sex. The thesis findings suggest the association follows a similar pattern between males and females. However, there may be subtle differences in the association revealed in Study 2. The results suggested that increases in depressive symptoms between changes in drinking frequency were higher on average among females. Overall, the findings of the current thesis add to previous evidence that suggests that while females are at greater risk for depression, the co-occurrence between alcohol consumption and depression may follow a similar pattern (Fleming et al., 2008; Verdurmen et al., 2005).

Clinical Implications

The findings presented in the two empirical studies confirm the strong link between alcohol consumption and depression in adolescence (Edwards et al., 2014a; Salom et al.,
These findings carry important clinical implications that strongly suggest prevention of adolescent depression could be achieved by reducing or delaying alcohol consumption in adolescence.

The findings from the current thesis suggest the effects of alcohol consumption on depression is strongest in early adolescence. According to the results from Study 1, the risk of depression among 11-year-old drinkers is 84% higher than in non-drinkers. Whereas, at age 15 the risk of depression in drinkers declined to 26% and by age 17 was 4%. These findings provide support for the current Australian drinking guidelines that recommend children under the age of 15 abstain from alcohol consumption (NHMRC, 2009a). However, the results of the two empirical studies within this thesis indicate that approximately one-fifth of young adolescents (ages 11 to 13) and one-third of middle adolescents (ages 14 to 15) consumed alcohol in the past month. Furthermore, past Australian research indicates that during early adolescence approximately 11% of boys and 7% of girls in Year 7 consumed alcohol more than three times in the past month (Toumbourou et al., 2009). These findings suggest that, despite current drinking guidelines that recommend abstinence prior to age 15, a significant proportion of young Australian adolescents consume alcohol, which substantially increases their risk of depression.

These findings suggest the prevention of alcohol consumption in early adolescence is of critical importance to the mental health outcomes of young people. The current findings suggest preventative efforts that encourage adolescents to delay alcohol initiation may also decrease the rate of depression in early adolescence (Skogen et al., 2016), a developmental period when depression first begins to emerge. Despite the strong focus on the prevention of alcohol consumption in adolescence, the rates of consumption remain high, suggesting the need for prevention programs that commence in primary school.
Furthermore, the findings from both studies also demonstrate that non-clinical levels of alcohol consumption increase the risk for depression. The results of Study 2 suggest that even infrequent monthly drinking (one or two times in the past month) is associated with higher depressive symptoms one year later. This finding further suggests that interventions targeting alcohol consumption should not be restricted to the heaviest drinkers in adolescence (Rose, 2001). High prevalence patterns of drinking (i.e. consuming alcohol on one or two occasions in the past month) also increase the risk of depression.

In regards to clinical practice, the findings confirm the need for clinicians to assess for alcohol consumption as part of mental health assessments in adolescents. For adolescents suffering from depression, alcohol consumption may contribute to symptoms and should be considered in treatment planning. Normative low frequency drinking should also not be ignored by clinicians and may need to be addressed in order to promote recovery, and prevent relapse. Clinicians should also consider the developmental stage of the adolescent; thus, drinking in early and mid-adolescence may be a more critical factor in depression than drinking in late adolescence.

Finally, despite female adolescents being at increased risk of depression than males the findings suggest the co-occurrence of alcohol consumption and depression follows similar patterns across sexes. Thus, prevention efforts addressing the co-occurrence of alcohol consumption and depression could possibly be similar for both male and female adolescents.

**Strengths and Limitations**

One of the major strengths of this thesis is the use of data from two large state-wide representative samples of Australian adolescents. The results of this thesis are therefore generalisable to the Australian population of adolescents. This thesis took an ecological perspective and controlled for a wide range of other risk factors that may confound this association. Supporting the ecological approach taken in this thesis was the use of MLM
analytical procedures in both studies, which controlled for multiple levels. MLM also controlled for clustering at the school level, which reduced the risk of Type I errors (Bickel, 2007).

A major strength of Study 2 is the longitudinal design with high retention rates. It provides information about the temporal nature of the association between alcohol consumption as a predictor of depressive symptoms. It demonstrates that earlier alcohol consumption increases the risk of depressive symptoms one year later in adolescence, after adjusting for baseline depressive symptoms.

The thesis also examined sub-clinical levels of depressive symptoms and non-clinical alcohol consumption. This is important from a prevention perspective, particularly given the high prevalence of sub-clinical mental health problems and drinking in adolescence. This thesis also examined the mediating effects of age and biological sex. While developmental trajectories can follow different patterns, much of the previous research has focused on examining linear associations. This thesis extends past research by also examining non-linear associations. The current thesis provided evidence of a curvilinear association between alcohol consumption and depressive symptoms in adolescents.

Despite the thesis strengths, it has limitations. In regards to Study 1, the cross-sectional design is the study’s biggest limitation; such a design precludes any conclusions regarding causality and the temporal nature of the association between alcohol consumption and depressive symptoms, and cannot identify which precedes the other. Thus, the results of this study cannot rule out the self-medication and shared aetiology hypotheses as possible explanations for the association.

In Study 2, alcohol consumption was measured differently across cohorts due to developmental differences. This measure was condensed to form one variable for the MLM,
which may be less reliable. As a result, valuable information regarding the nature of the association over more frequent drinking patterns was also lost. While this study employed a longitudinal design, the use of only two waves of data does not provide sufficient evidence to examine developmental changes over time and the mediating effects of age (Willett et al., 1998). Studies that provide more than two data points are best for examining the nature and shape of the developmental trajectory (Willett et al., 1998). Future research should examine longer time periods and more than two data points.

In both studies, the results may not be generalisable to early school leavers and those frequently skipping school, who will be underrepresented in the current study. Prior research indicates that truant and early school leavers tend to experience higher prevalence of substance use and depression (Esch et al., 2014; Townshend et al., 2007). Furthermore, both studies aimed to examine non-clinical patterns of alcohol consumption; however, neither controlled for adolescents engaging in heavier and risky drinking patterns in the past month. Therefore, this thesis cannot unequivocally determine whether non-clinical patterns of alcohol consumption are directly linked to increases in depressive symptoms.

**Future Research Directions**

The current thesis provides cross-sectional evidence that age moderates the association between alcohol consumption as a predictor of depression. The longitudinal study within this thesis failed to identify significant effects in regards to age as a moderator of the association. This may be due to the short one-year timeframe; hence, longitudinal studies of longer duration are needed to better understand the changes in the association between alcohol consumption as a risk factor for depression across adolescent development. In particular, the timing of alcohol initiation should be examined, as earlier consumption may be linked with a stronger risk for depression than consumption in middle to late adolescence.
The findings from the current thesis suggest the association between non-clinical alcohol consumption and depressive symptoms does not differ between males and females. However, the findings within the literature in regards to this question are mixed. Past research suggests that in early adolescence, alcohol-use-related problems were associated with higher initial levels of depressive symptoms in females compared to males (Marmorstein, 2009). By late adolescence, however, there was little difference in depressive symptoms between high and low alcohol problems for both sexes. Perhaps the association differs between males and females at different ages and developmental stages. Future studies should examine a three-way interaction between alcohol consumption, sex and age on depressive symptoms in adolescence.

This thesis has provided evidence of a curvilinear association between alcohol consumption as a predictor of depression. However, due to limited information obtained from the youngest cohort in relation to the frequency of drinking, this association was unable to be fully examined. Future studies should examine non-linear associations between alcohol consumption and depression over a wider range of drinking frequencies. The nature of this association may differ with higher and less prevalent patterns of drinking. As discussed above, perhaps alcohol consumption predicts increases in depressive symptoms at lower levels of consumption. However, heavier consumption may be linked with self-medicating effects. Future research should examine both hypotheses at different drinking frequencies and quantities.

Finally, it is likely that this association is moderated by other factors associated with both alcohol consumption and depression. Future studies should consider other risk factors as potential moderators of the association. One suggestion may be to examine whether peer connectedness moderates the association between alcohol consumption and depression. Past research indicates that low peer connectedness increases the risk of depression (Chen et al.,
2012; Costello et al., 2008). However, little is known about the effect of peer connectedness on the association between alcohol consumption and depression in adolescence. As with adult samples, peer connectedness may influence the non-linear association among adolescents that was identified in this thesis. For example, individuals in mid- to late adolescence who abstain from alcohol may have fewer peer connections and thus be at increased risk of depression compared to their socially connected peers who may be experimenting with alcohol in social situations. Such an association is likely to differ depending on the developmental stage; thus, early alcohol initiation may increase the risk of depression irrespective of peer connections due to developmental effects. Future studies should consider potential mediating effects of peer connectedness and continue to examine non-linear associations over a longer period to better detect changes in the association with age.

**Conclusion**

In summary, the results of this thesis support the hypothesis that alcohol consumption is closely linked with depressive symptoms in adolescence. The consumption of alcohol was associated with an increased risk of both psychological distress and depressive symptoms after controlling for a wide range of other risk factors that may confound this effect. The findings of this thesis also suggest that the association between alcohol consumption and depression does not differ significantly between males and females. There was evidence of a non-linear association that indicated the effects of alcohol consumption on depressive symptoms may plateau with more regular monthly alcohol consumption, suggesting that merely experimenting with alcohol may pose some of the greatest risks to mental health. More regular monthly consumption increased the risk of sub-clinical levels of depressive symptoms; however, sub-clinical depression adversely affects adolescent development and should be a focus of prevention. Overall, the results support the notion that adolescent
depression is closely linked with alcohol. Moreover, depression in adolescence could be reduced or prevented through the avoidance or reduction in alcohol consumption.

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Appendix B: Victorian Adolescent Health and Wellbeing Survey Instrument

SECTION A: ABOUT YOU

This first section asks some general questions about you.

1. How old are you?  □ 11  □ 12  □ 13  □ 14  □ 15  □ 16
    □ 17  □ 18

2. What year are you in?  □ Year 7  □ Year 9  □ Year 11

3. Are you:  □ Male  □ Female

4. In which country were you born?
    □ Australia  □ Another country (please specify)

5. In which country was your mother born?
    □ Australia  □ Another country (please specify)

6. In which country was your father born?
    □ Australia  □ Another country (please specify)

7. Are you or your family Aboriginal or Torres Strait Islander?
    □ Yes  □ No

8. What language do you speak at home? Please put a cross in one box only
    □ English
    □ Another language (please specify)
    □ English and another language (please specify)

9. (a) Have you changed homes in the past year?  □ Yes  □ No
    (b) What is the postcode of the suburb/town/area where you live now?
        Postcode: □ □ □ □ □

10. Have you changed schools (including changing from primary to secondary school) in the past year?
    □ Yes  □ No
a. How many times have you changed schools (including changing from primary to secondary school) since kindergarten?

☐ Never
☐ 1 or 2 times
☐ 3 or 4 times
☐ 5 or 6 times
☐ 7 or more times

11. How many times have you changed homes since kindergarten?

☐ Never
☐ 1 or 2 times
☐ 3 or 4 times
☐ 5 or 6 times
☐ 7 or more times

SECTION B: SCHOOL EXPERIENCES

This next section asks about your experiences in school.

1. Putting them all together, what were your marks like last year?

☐ Very good ☐ Good ☐ Average ☐ Poor ☐ Very Poor

2. During the last 4 weeks, when school was in session, how many whole days have you missed because you skipped or “wagged”?

☐ None ☐ 3 ☐ 11 or more
☐ 1 ☐ 4 – 5
☐ 2 ☐ 6 – 10
3. For the next questions how much do you agree with the following statements.
   YES! means you definitely agree,
   yes means you agree a bit,
   no means you disagree a bit,
   NO! means you definitely disagree.
   Mark only one answer for each question.

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>In my school, students have lots of chances to help decide things like class activities and rules.</td>
<td>[ ]</td>
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<tr>
<td>B.</td>
<td>Teachers ask me to work on special classroom projects.</td>
<td>[ ]</td>
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<tr>
<td>C.</td>
<td>My teachers notice when I am doing a good job and let me know about it.</td>
<td>[ ]</td>
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<tr>
<td>D.</td>
<td>There are lots of chances for students in my school to get involved in sports, clubs, organisations, or other school activities outside of class.</td>
<td>[ ]</td>
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<tr>
<td>E.</td>
<td>There are lots of chances for students in my school to talk with a teacher one-on-one.</td>
<td>[ ]</td>
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<tr>
<td>F.</td>
<td>I feel safe at my school.</td>
<td>[ ]</td>
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<tr>
<td>G.</td>
<td>The school lets my parents know when I have done something well.</td>
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<tr>
<td>H.</td>
<td>My teachers praise me (tell me I'm doing well) when I work hard in school.</td>
<td>[ ]</td>
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<tr>
<td>I.</td>
<td>I have lots of chances to be part of class discussions or activities.</td>
<td>[ ]</td>
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<tr>
<td>J.</td>
<td>Are your school marks better than the marks of most students in your class?</td>
<td>[ ]</td>
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<td>[ ]</td>
</tr>
</tbody>
</table>

4. How often do you feel that the school work you are assigned is meaningful and important?
   Almost always | Often | Sometimes | Rarely | Never

5. How interesting are most of your school subjects to you?
   Very interesting | Quite interesting | Fairly interesting | Slightly boring | Very boring
6. How important do you think the things you are learning in school are going to be for your later life?

- Very important
- Quite important
- Fairly important
- Slightly important
- Not at all important

7. What is the highest level of education you would like to get?

- Year 10
- Year 11
- Year 12
- Trade Qualification (apprenticeship)
- TAFE Certificate (or similar)
- University

8. Now thinking back over the past year in school, how often did you ...

<table>
<thead>
<tr>
<th></th>
<th>Almost Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Enjoy being in school?</td>
<td></td>
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<tr>
<td>B. Hate being in school?</td>
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<tr>
<td>C. Try to do your best work in school?</td>
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</tbody>
</table>

9a. Has anyone teased or called you names recently?

- Yes
- No (go to question 10a)

9b. How often?

- Most days
- About once a week
- Less than once a week

9c. Were you upset or angry when it happened?

- Not at all
- A bit
- A lot
10a. Has anyone spread rumours about you recently?
   □ Yes □ No (go to question 11a)

10b. How often? □ Most days □ About once a week □ Less than once a week

10c. Were you upset or angry when it happened?
   □ Not at all □ A bit □ A lot

11a. Have you been deliberately left out of things recently?
   □ Yes □ No (go to question 12a)

11b. How often? □ Most days □ About once a week □ Less than once a week

11c. Were you upset or angry when it happened?
   □ Not at all □ A bit □ A lot

12a. Have you been threatened physically or actually hurt by another student recently?
   □ Yes □ No (go to next section)

12b. How often? □ Most days □ About once a week □ Less than once a week

12c. Were you upset or angry when it happened?
   □ Not at all □ A bit □ A lot
SECTION C: YOUR FAMILY

This section asks you questions about your family.

1a. Which best describes where you live?
   - [ ] In one home only (go to question 2a)
   - [ ] In two (or more) homes

1b. Think of where you live most of the time. On average, how many days a month do you spend in this home? ____________

1c. On average, how many days a month do you spend in your other home/s?

2a. Think of where you live most of the time. Who lives there with you? Please choose ALL that apply:
   - [ ] Mother
   - [ ] Father
   - [ ] Aunt
   - [ ] Sister(s)
   - [ ] Stepfather
   - [ ] Stepbrother(s) or stepsister(s)
   - [ ] Foster Mother
   - [ ] Foster Father
   - [ ] Stepbrother(s) or stepsister(s)
   - [ ] Grandmother
   - [ ] Grandfather
   - [ ] Other Adults
   - [ ] Other (please explain): ____________________________

2b. If you live in two (or more) homes, in the other home(s), who lives there with you? Please choose ALL that apply:
   - [ ] Mother
   - [ ] Father
   - [ ] Aunt
   - [ ] Sister(s)
   - [ ] Stepfather
   - [ ] Stepbrother(s) or stepsister(s)
   - [ ] Foster Mother
   - [ ] Foster Father
   - [ ] Stepbrother(s) or stepsister(s)
   - [ ] Grandmother
   - [ ] Grandfather
   - [ ] Other Adults
   - [ ] I don't live with anyone at the moment
   - [ ] Other (please explain): ____________________________
3. Does your family own a car, van or truck?
   - [ ] No
   - [ ] Yes one
   - [ ] Yes, two or more

4. Do you have your own bedroom for yourself?
   - [ ] Yes
   - [ ] No

5. During the past 12 months, how many times did you travel away on holiday with your family?
   - [ ] Not at all
   - [ ] Once
   - [ ] Twice
   - [ ] More than twice

6. How many computers does your family own?
   - [ ] None
   - [ ] One
   - [ ] Two
   - [ ] More than two

---

7. These questions ask you about your family

When we ask about your mother and father we want you to think about who you live with most of the time. This includes step-parents, foster parents or guardians.

<table>
<thead>
<tr>
<th>Question</th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
<th>This doesn’t apply to me</th>
</tr>
</thead>
<tbody>
<tr>
<td>7a. Do you feel very close to your mother?</td>
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<tr>
<td>7b. Do you share your thoughts and feelings with your mother?</td>
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<td>7c. Do you enjoy spending time with your mother?</td>
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<td>7d. Do you feel very close to your father?</td>
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<td>7e. Do you share your thoughts and feelings with your father?</td>
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<td>7f. Do you enjoy spending time with your father?</td>
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<td>7g. If I had a personal problem, I could ask my mum or dad for help.</td>
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<td>7h. My parents give me lots of chances to do fun things with them.</td>
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<td>7i. We argue about the same things in my family over and over.</td>
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<td>7j. People in my family have serious arguments.</td>
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<td>7k. People in my family often insult or yell at each other.</td>
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<td>7l. My Parents ask me what I think before most family decisions affecting me are made.</td>
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<td>7m. My parents ask me if I've done my homework.</td>
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<td>7n. My parents would know if I didn't come home on time</td>
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<td>7o. The rules in my family are clear.</td>
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<td>7p. When I am not at home, one of my parents knows where I am and who I am with.</td>
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<td>7q. My parents want me to call if I'm going to be late getting home.</td>
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<td>7r. My family has clear rules about alcohol and drug use.</td>
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<tr>
<td>7s. If you drank some alcohol (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezer's or UDL's) without your parents' permission, would you be caught by your parents?</td>
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<td>7t. If you carried a weapon without your parents' permission, would you be caught by your parents?</td>
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<td>7u. If you skipped or wagged school without your parents' permission, would you be caught by your parents?</td>
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</tbody>
</table>

8. My parents notice when I am doing a good job and let me know about it.
   - All of the time
   - Often
   - Sometimes
   - Never or almost never

9. How often do your parents tell you they're proud of you for something you've done?
   - All of the time
   - Often
   - Sometimes
   - Never or almost never

10. Which of the following best describes your home situation?
    - My home is smoke free
    - People occasionally smoke in the house
    - People frequently smoke in the house
SECTION D: Health and Personal Experiences

This next section asks you about your health and experiences

1a. Do you know how tall you are?
   □ Yes   □ No (go to question 1b)
   How tall are you? ____ cm

1b. Do you know how much you weigh?
   □ Yes   □ No (go to question 2)
   How much do you weigh? ____ kg

2. In general, how would you describe your health?
   □ Excellent    □ Very good    □ Good    □ Fair    □ Poor

3. Do you currently need or take prescription medicine (other than vitamins or birth control pills)?
   □ Yes   □ No (go to question 4)
   Is this because of ANY medical, mental health or other health conditions?
   □ Yes   □ No (go to question 4)
   Is this a condition that has lasted or expected to last for at least 12 months?
   □ Yes   □ No

4. Do you need or use medical care, mental health or other health services on a regular basis?
   □ Yes   □ No (go to question 5)
   Is this because of ANY medical, mental health or other health conditions?
   □ Yes   □ No (go to question 5)
   Is this a condition that has lasted or expected to last for at least 12 months?
   □ Yes   □ No
5. Do you have difficulty doing or need assistance to do day-to-day activities?
   □ Yes □ No (go to question 6)
   Is this because of ANY medical, mental health or other health conditions?
   □ Yes □ No (go to question 6)
   Is this a condition that has lasted or expected to last for at least 12 months?
   □ Yes □ No

6. Do you need or get special therapy? (for example: physical, occupational, speech or respiratory therapy)
   □ Yes □ No (go to question 7)
   Is this because of ANY medical, mental health or other health conditions?
   □ Yes □ No (go to question 7)
   Is this a condition that has lasted or expected to last for at least 12 months?
   □ Yes □ No

7. Do you need or get treatment or counselling for any kind of mental health, substance abuse or emotional problem?
   □ Yes □ No (go to question 8)
   Is this a condition that has lasted or expected to last for at least 12 months?
   □ Yes □ No

8. Have you ever been told by a doctor or a nurse that you have asthma?
   □ Yes □ No (go to question 9)
   Have you had symptoms of asthma or taken treatment for asthma in the last 12 months?
   □ Yes □ No (go to question 9)
   Do you have a written asthma action plan, that is written instruction of what to do if your asthma is worse or out of control?
   □ Yes □ No □ Don't know
These next questions ask you about your oral/dental health

9. How many times do you usually brush your teeth each day?
   - Never
   - Less than once a day
   - Once a day
   - Twice a day
   - More than twice a day

10. How would you rate your oral (dental) health?
   - Excellent
   - Very good
   - Good
   - Fair
   - Poor
   - Don’t Know

11. During the past 12 months how often have you had a toothache?
   - Very often
   - Often
   - Sometimes
   - Hardly ever
   - Never
   - Don’t Know

12. How long ago did you visit a dentist about your teeth?
   - Less than 12 months
   - 5-10 years
   - Don’t know
   - 1-2 years
   - 10 + years
   - Never visited a dentist
   - 2-5 years

13. How often on average do you seek care from a dentist?
   - Two or more times per year
   - Once a year
   - Once in two years
   - Less often than that
   - Don’t know

14. Is your usual reason for visiting a dentist for:
   - Check up OR
   - When you have a problem
For the next questions, you will be asked about your physical activity.

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. Some examples are: running, fast walking, riding a bike, dancing, skateboarding, swimming, soccer, basketball, football & surfing.

Add up all the time you spend in physical activity each day:

15a. Over the past 7 days on how many days were you physically active for a total of at least 60 minutes per day?

0 days □ □ □ □ □ □ □ □
1 day □ □ □ □ □ □ □ □
2 days □ □ □ □ □ □ □ □
3 days □ □ □ □ □ □ □ □
4 days □ □ □ □ □ □ □ □
5 days □ □ □ □ □ □ □ □
6 days □ □ □ □ □ □ □ □
7 days □ □ □ □ □ □ □ □

15b. Over a normal week, on how many days were you physically active for a total of at least 60 minutes per day?

0 days □ □ □ □ □ □ □ □
1 day □ □ □ □ □ □ □ □
2 days □ □ □ □ □ □ □ □
3 days □ □ □ □ □ □ □ □
4 days □ □ □ □ □ □ □ □
5 days □ □ □ □ □ □ □ □
6 days □ □ □ □ □ □ □ □
7 days □ □ □ □ □ □ □ □

16. How much do you enjoy physical activity or exercise?

□ Not at all □ A bit □ Quite a lot □ A lot

17. Were you sick in the last week, or did anything stop you from doing your normal physical activities?

□ Yes □ No

18. On school days for how many hours do you usually watch TV?

□ None □ Less than one hour □ 1 to 2 hours □ 2 to 4 hours □ 4 to 6 hours □ More than 6 hours

19. On weekend days for how many hours do you usually watch TV?

□ None □ Less than one hour □ 1 to 2 hours □ 2 to 4 hours □ 4 to 6 hours □ More than 6 hours

20. On school days how many hours do you usually spend on a computer or playing video games such as gamecube, xbox, PS2, PSP, GBA, etc.?

□ None □ Less than one hour □ 1 to 2 hours □ 2 to 4 hours □ 4 to 6 hours □ More than 6 hours
21. On weekend days how many hours do you usually spend on a computer or playing video games such as gamecube, xbox, PS2, PSP, GBA, etc.?

☐ None  ☐ Less than one hour  ☐ 1 to 2 hours  ☐ 2 to 4 hours  ☐ 4 to 6 hours  ☐ More than 6 hours

22. When you go outside during the middle of the day in summer do you use a sunscreen on areas of your skin which are not protected?

☐ Never  ☐ Sometimes when it's sunny  ☐ Always when it's sunny  ☐ Always when I go outside

23. What sunscreen protection factors (SPF) do you usually use? (please choose the closest answer that fits you best)

☐ Mild (SPF 5)  ☐ Medium (SPF 10)  ☐ Block out (SPF 15+)  ☐ Maximum (SPF 30+)

24. When you are out in the sun during the summer do you wear a hat?

☐ Never  ☐ Sometimes  ☐ Often  ☐ Always

25. When you are out in the sun during summer do you wear sunglasses?

☐ Never  ☐ Sometimes  ☐ Often  ☐ Always

These next questions are about what you eat

26. On how many days per week do you eat breakfast or something before school starts?

☐ None  ☐ 1  ☐ 2  ☐ 3  ☐ 4  ☐ 5
27. How many serves of the following foods do you usually have per day?

<table>
<thead>
<tr>
<th>Number of serves per day</th>
<th>None</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 or more</th>
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<tbody>
<tr>
<td>Fruit, 1 serve =</td>
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<td></td>
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<tr>
<td>- 1 piece of fruit, such as apple or pear OR</td>
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<tr>
<td>- 1 small packet dried fruit, like sultanas OR</td>
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<tr>
<td>- ½ cup of fruit salad or canned fruit</td>
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<tr>
<td>Vegetables, 1 serve =</td>
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<tr>
<td>- ½ cup cooked vegetables OR</td>
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<tr>
<td>- 1 cup salad OR</td>
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<td></td>
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<tr>
<td>- 1 medium-size potato</td>
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</tbody>
</table>

We are now going to ask about how you feel about your weight and some questions about your eating.

28. How would you feel if you gained one to two kilograms in weight. Would you be...?

- [ ] Pleased
- [ ] Not bothered
- [ ] A little concerned
- [ ] Worried

29a. Over the last month have you been afraid you might gain weight, or become fat?

- [ ] Yes
- [ ] No (go to question 30)

29b. How often did you feel afraid you might gain weight?

- [ ] Once or twice (less than once a week)
- [ ] About one day a week
- [ ] Two or three days a week
- [ ] Four or more days a week
- [ ] Every day or almost every day

29c. How concerned are you that you might gain weight?

- [ ] Only a little concerned
- [ ] Moderately concerned
- [ ] Very concerned
- [ ] Extremely concerned

30. How important is your weight in how you feel about yourself as a person?

- [ ] Not important
- [ ] A bit important
- [ ] Moderately important
- [ ] Very important
31. How do you feel about your weight at the moment? Are you…

- [ ] Very underweight
- [ ] Somewhat underweight
- [ ] About the right weight
- [ ] Somewhat overweight
- [ ] Very overweight

32a. In the last 4 weeks have you gone all day (12 or more hours) without eating to control your weight or shape? (Do not include religious reasons or the World Vision fast)

- [ ] Yes
- [ ] No (go to question 33a)

32b. How often during the last 4 weeks have you gone all day without eating? (12 hours or more)

- [ ] Once or twice (less than once a week)
- [ ] About one day a week
- [ ] Two or three days a week
- [ ] Four or more days a week
- [ ] Every day or almost every day

32c. How long have you been having days without eating? (12 hours or more)

- [ ] Less than 4 weeks
- [ ] Between 4 weeks and 3 months
- [ ] Between 3 months and 6 months
- [ ] Between 6 months and a year
- [ ] Longer than a year

33a. In the last 4 weeks have you felt at any time you have lost control of your eating or felt you ate much too much?

- [ ] Yes
- [ ] No (go to question 34a)

33b. How often during the last 4 weeks have you felt like this?

- [ ] Once or twice (less than once a week)
- [ ] About one day a week
- [ ] Two or three days a week
- [ ] Four or more days a week
- [ ] Every day or almost every day

33c. How long have you been having these feelings that you have lost control of your eating?

- [ ] Less than 4 weeks
- [ ] Between 4 weeks and 3 months
- [ ] Between 3 months and 6 months
- [ ] Between 6 months and a year
- [ ] Longer than a year
33d. How difficult would it have been to stop after starting to eat in this way?

- Fairly easy
- Fairly difficult
- Very difficult
- Impossible

33e. We would like you to think about a typical episode when you have felt that you have lost control of your eating, or that you ate much too much. Which of the following is the closest to the amount of food you would eat in less than two hours?

- 2 pieces of bread + 4 scoops of ice cream + 2 biscuits
- 8 pieces of bread + half a litre of ice cream + 5 biscuits
- 12 pieces of bread + 1 litre of ice cream + 10 biscuits
- 1 loaf of bread + 2 litres of ice cream + 1 packet of biscuits
- Less than any of these amounts

34a. Over the last 4 weeks have you taken laxatives in order to control your weight?

- Yes
- No (go to question 35a)

34b. How often over the last 4 weeks have you taken laxatives?

- Once or twice (less than once a week)
- About one day a week
- Two or three days a week
- Four or more days a week
- Every day or almost every day

34c. How long have you been taking laxatives?

- Less than 4 weeks
- Between 4 weeks and 3 months
- Between 3 months and 6 months
- Between 6 months and a year
- Longer than a year

34d. When taking laxatives how many tablets would you take in a day?

- One
- Between 1 and 5
- Between 6 and 10
- Between 11 and 15
- Between 16 and 20
- More than 20

35a. Over the last 4 weeks have you taken diuretics (water tablets) in order to control your weight?

- Yes
- No (go to question 36a)
35b. How often during the last 4 weeks have you taken diuretics?

- [ ] Once or twice (less than once a week)
- [ ] About one day a week
- [ ] Two or three days a week
- [ ] Four or more days a week
- [ ] Every day or almost every day

35c. How long have you been taking diuretics?

- [ ] Less than 4 weeks
- [ ] Between 4 weeks and 3 months
- [ ] Between 3 months and 6 months
- [ ] Between 6 months and a year
- [ ] Longer than a year

36a. Over the last 4 weeks have you made yourself vomit as a means of controlling your shape or weight?

- [ ] Yes
- [ ] No (go to question 37a)

36b. How often during the last 4 weeks have you make yourself vomit as a means of controlling your shape or weight?

- [ ] Once or twice (less than once a week)
- [ ] About one day a week
- [ ] Two or three days a week
- [ ] Four or more days a week
- [ ] Every day or almost every day

36c. How long have you been making yourself vomit to control your weight?

- [ ] Less than 4 weeks
- [ ] Between 4 weeks and 3 months
- [ ] Between 3 months and 6 months
- [ ] Between 6 months and a year
- [ ] Longer than a year

37a. In the last 4 weeks, have you exercised vigorously in order to control your weight? (i.e. any exercise involving heavy breathing, puffing or panting)

- [ ] Yes
- [ ] No (go to question 38a)

37b. How often in the last 4 weeks have you exercised vigorously in order to control your weight?

- [ ] Once or twice (less than once a week)
- [ ] About one day a week
- [ ] Two or three days a week
- [ ] Four or more days a week
- [ ] Every day or almost every day
37c. How long have you been exercising hard to control your weight?

☐ Less than 4 weeks  ☐ Between 4 weeks and 3 months  ☐ Between 3 months and 6 months  ☐ Between 5 months and a year  ☐ Longer than a year

These next questions ask about health services you may use

38. Please tick the box that best shows how often you see the following health care professions

<table>
<thead>
<tr>
<th>Profession</th>
<th>Never</th>
<th>Monthly</th>
<th>Every 3 months</th>
<th>Every 6 months</th>
<th>Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Your local doctor (GP)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>B. Dentist</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>C. A counsellor / psychologist / psychiatrist</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>D. A physiotherapist / osteopath / chiropractor</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>E. Optometrist (eye specialist)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>F. Medical specialist</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

39. If you see a medical specialist, what is this for?

________________________________________________________________________

40a. Did you or your family think you should have seen any of the above health care professionals more often?

☐ Yes  ☐ No (go to question 41)

40b. Please tell us who you felt you should have seen more often? (tick all that apply)

☐ Your local doctor (GP)  ☐ Dentist
☐ A counsellor / psychologist / psychiatrist  ☐ A physiotherapist / osteopath / chiropractor
☐ Optometrist (eye specialist)  ☐ Medical specialist
40c. What was the reason you did not see the above health care professional more often?

☐ Couldn’t afford it  ☐ Couldn’t get to health professional

☐ No health care professional in the area  ☐ Other (go to question 40d)

40d. Please describe the reason you did not see the above health care professionals more often ________________________________

These next questions are about changes that may be happening to your body. These changes normally happen to different people at different ages. If you are unsure of which answer to choose, just give your best guess.

<table>
<thead>
<tr>
<th>41. Would you say that your growth in height</th>
<th>Has not started yet</th>
<th>Has barely started</th>
<th>Has definitely started</th>
<th>Seems complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>42. And how about the growth of your body hair? (&quot;Body hair&quot; means hair in any place other than your head, such as under your arms). Would you say that your body hair growth:</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>43. Have you noticed any skin changes, especially pimples?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>44. Have you noticed that your breasts have begun to grow?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

45. Have you begun to menstruate?

☐ No  ☐ If no (go to question 46)
☐ Yes  45b. If yes, how old were you when you had your first period?

______ Years and ________ Months old

45c. Have you had a period in the last 3 months?  ☐ Yes  ☐ No

45d. How long is it since you have had a period? (enter the number of weeks or fraction of a week, e.g., 3 days = 0.5) ________

46. Have you ever had sex?

☐ No  ☐ If no (go to next section)
☐ Yes  47. If yes, how old were you when you first had sex?

______ Years and ________ Months old
47. When do you or your partner use contraceptives?

<table>
<thead>
<tr>
<th>Condoms</th>
<th>Never</th>
<th>Sometimes</th>
<th>Most times</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Control Pills</td>
<td>Never</td>
<td>Sometimes</td>
<td>Most times</td>
<td>Always</td>
</tr>
<tr>
<td>Some other contraceptive method</td>
<td>Never</td>
<td>Sometimes</td>
<td>Most times</td>
<td>Always</td>
</tr>
</tbody>
</table>

SECTION E: Your Experiences

The next section asks about your experience with tobacco, alcohol, and other drugs. REMEMBER your answers are completely confidential.

For the next group of questions, please think about your entire lifetime. If you haven’t ever used the drug in your lifetime, please mark “Never” for those questions.

<table>
<thead>
<tr>
<th>1. In your lifetime have you ever:</th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoked cigarettes?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Had more than just a few sips of an alcoholic beverage (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezer's or UDL's)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Used marijuana/cannabis (pot, wood, grass)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Sniffed glue, breathed the contents of an aerosol spray can, or inhaled other gases (i.e. Amyl Nitrile, poppers) or sprays, in order to get high?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Used phenoxydine (pox, PX, breeze)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Used other illegal drugs (like cocaine, heroin, ecstasy, or amphetamines/apoed)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Have you smoked cigarettes in the past year?

☐ Never  ☐ Regularly, but less than every day  ☐ Almost every day or every day
☐ Once or twice  ☐ Once in a while but not regularly
For the next group of questions, please think only about the past 30 days. If you haven't used the drugs in the past 30 days, please mark “Never” for that question.

3. In the past 30 days, have you:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoked cigarettes?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>B. Had more than just a few sips of an alcoholic beverage (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezer’s or UDL’s)?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>C. Used marijuana/cannabis (pot, weed, grass)?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>D. Sniffed glue, breathed the contents of an aerosol spray can, or inhaled other gases (i.e. Amyl Nitrate, poppers) or sprays, in order to get high?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>E. Used phenoxydine (pox, PX, breeze)?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>F. Used other illegal drugs (like cocaine, heroin, ecstasy, or amphetamines/speed)?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

4. If you have ever used any illegal drugs, how old were you when you took them?

_____ Years.

5. How frequently have you smoked during the past 30 days?

☐ Not at all
☐ Less than one cigarette per day
☐ 1-5 cigarettes per day
☐ 6-9 cigarettes per day
☐ 10-19 cigarettes per day
☐ 20-29 cigarettes per day
☐ 30-30 cigarettes per day
☐ 40 or more cigarettes per day

If you have never had more than a few sips of alcohol in your lifetime please skip to Question 8.
6. The last time you did have alcohol, where did you get it? Please choose only one answer.

- I bought it.
- OR

  - Where did you buy it?
  - Hotel, pub or tavern
  - Licensed store or supermarket
  - Walk-in-bottle-shop
  - Club
  - Restaurant
  - Disco or dance
  - Sporting event
  - Other

- I didn’t buy it.
  - How did you get it?
  - My parent(s) gave it to me
  - My brother or sister gave it to me
  - I took it from home without my parents’ permission
  - Friends gave it to me
  - I got someone to buy it for me
  - Other ____________________

7. Think back over the past 2 weeks. How many times have you had five or more alcoholic drinks in a row?

- None
- Once
- Twice
- 3-5 times
- 6-9 times
- 10 or more times

Thinking about how easy it is to get these substances:

<table>
<thead>
<tr>
<th>Substances</th>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. If you wanted to get some cigarettes, how easy would it be for you to get some?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. If you wanted to get some alcohol (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezer’s or UDL’s), how easy would it be for you to get some?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. If you wanted to get some marijuana/cannabis (pot, weed, grass), how easy would it be for you to get some?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. If you wanted to get a drug like cocaine, heroin, LSD (acid) or amphetamines (speed), how easy would it be for you to get some?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12. The next questions ask for your opinions on drugs. How much do you think people risk harming themselves (physically or in other ways) if they:

<table>
<thead>
<tr>
<th>A. Smoke one or more packs of cigarettes a day?</th>
<th>No risk</th>
<th>Slight risk</th>
<th>Moderate risk</th>
<th>Great risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Try marijuana/cannabis (pot, weed, grass) once or twice?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Use marijuana/cannabis (pot, weed, grass) regularly?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Take one or two drinks of an alcoholic beverage (like beer, wine, spirits or premixed drinks such as Bacardi Breezer’s or UDL’s) nearly every day?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. How many times in the past year (12 months) have you

<table>
<thead>
<tr>
<th>A. Carried a weapon?</th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Been suspended from school?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Sold illegal drugs?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Stolen or tried to steal a motor vehicle such as a car or motorcycle?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Attacked someone with the idea of seriously hurting them?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Been drunk or high at school?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
14. For this next set of questions, think of your four best friends (the friends you feel closest to). These questions will ask about things that have happened in the past year.

<table>
<thead>
<tr>
<th></th>
<th>None of my friends</th>
<th>1 of my friends</th>
<th>2 of my friends</th>
<th>3 of my friends</th>
<th>4 of my friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoked cigarettes?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Tried alcohol (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezer's or UDL's) when their parents didn't know about it?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Used marijuana/ cannabis (pot, weed, grass)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Used other illegal drugs (like cocaine, heroin, LSD/acid, or amphetamines/speed)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These next questions ask you about people in your family.

15. Has anyone in your family ever had a severe alcohol or drug problem?
   - [ ] Yes
   - [ ] No

16. Have any of your brothers or sisters ever:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
<th>Don't have any brothers or sisters</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoked cigarettes?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Drunk alcohol (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezer's or UDL's)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Used marijuana/ cannabis (pot, weed, grass)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Taken a weapon to school?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Been suspended or expelled from school?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. How wrong do your parents feel it would be for you to:

<table>
<thead>
<tr>
<th></th>
<th>Not wrong at all</th>
<th>A little bit wrong</th>
<th>Wrong</th>
<th>Very wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoke cigarettes?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Drink beer or wine regularly (at least once or twice a month)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Drink spirits regularly (at least once or twice a month)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>D.</strong> Drink pre-mixed drinks such as Bacardi Breezer’s or UDL’s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>E.</strong> Use marijuana/cannabis (pot, weed, grass)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>F.</strong> Steal something worth more than $10?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.</strong> Draw graffiti, or write things or draw pictures on buildings or other property (without the owner’s permission)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.</strong> Pick a fight with someone?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION F: Your Feelings

This section asks you about your thoughts and feelings.

1. During the past month, how much of the time:

<table>
<thead>
<tr>
<th>Question</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>A good bit of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Have you felt that the future looks hopeful and promising?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>B. Has your daily life been full of things that were interesting to you?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>C. Did you feel relaxed and free of tension?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>D. Have you generally enjoyed the things you do?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>E. Have you felt loved and wanted?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>F. When you got up in the morning how often did you expect to have an interesting day?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>G. Have you felt calm and peaceful?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>H. Were you able to relax without difficulty?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I. Has living been a wonderful adventure for you?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>J. Have you felt cheerful, light-hearted?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>K. Were you a happy person?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>L. Did you feel that your love relationships, loving and being loved were full and complete?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
2. How often during the past month, have you been waking up feeling fresh and rested?

☐ Always, every day
☐ Almost, ever day
☐ Most days
☐ Some days, but usually not
☐ Hardly ever
☐ Never wake up feeling rested

3. How happy, satisfied or pleased have you been with your personal life during the past month?

☐ Extremely happy, could not have been more satisfied or pleased
☐ Very happy most of the time
☐ Generally satisfied, pleased
☐ Sometimes fairly satisfied, sometimes fairly unhappy
☐ Generally dissatisfied, unhappy
☐ Very dissatisfied, unhappy

4. Please read each of the following statements, thinking about how it relates to your life, then select how true it is for you.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all true</th>
<th>2</th>
<th>3</th>
<th>Somewhat at true</th>
<th>5</th>
<th>6</th>
<th>Very true</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I feel like I am free to decide for myself how to live my life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. People I know tell me I am good at what I do</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. I get along with people I come into contact with</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not at all true</td>
<td>2</td>
<td>3</td>
<td>Somewhat true</td>
<td>5</td>
<td>6</td>
<td>Very true</td>
</tr>
<tr>
<td>---</td>
<td>----------------</td>
<td>---</td>
<td>---</td>
<td>---------------</td>
<td>---</td>
<td>---</td>
<td>----------</td>
</tr>
<tr>
<td>D.</td>
<td>I generally feel free to express my ideas and opinions</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>E.</td>
<td>I consider the people I regularly interact with to be my friends</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>F.</td>
<td>People in my life care about me</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>G.</td>
<td>Most days I feel a sense of accomplishment from what I do</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>H.</td>
<td>I feel like I can pretty much be myself in my daily situations</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I.</td>
<td>I often do not feel very capable</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

5. Please tell us how true each of the following statements are for you by answering **BIG YES**, little yes, little no, **BIG NO**!

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>I know how to relax when I feel tense.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>B.</td>
<td>I am always able to keep my feelings under control.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>C.</td>
<td>I know how to calm down if I am feeling nervous.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>D.</td>
<td>I control my temper when people are angry with me.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
The next questions are about having someone to turn to for advice when you have a problem.

6. How much do you agree or disagree with these statements about you?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Very strongly disagree</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither disagree or agree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Very strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. There is a special person who is around when I am in need</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. There is a special person with whom I can share my joys and sorrows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. I have a special person who is a real source of comfort to me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. There is a special person in my life who cares about my feelings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. I have an adult(s) that I trust and would turn to for advice if I was having problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We would now like to ask you about how you have been feeling over the last month.

7. In the past four weeks, how often...

<table>
<thead>
<tr>
<th>Question</th>
<th>None of the time</th>
<th>A little of the time</th>
<th>Some of the time</th>
<th>Most of the time</th>
<th>All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Did you feel tired for no good reason?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Did you feel nervous?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Did you feel so nervous that nothing could calm you down?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Did you feel hopeless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Did you feel restless or fidgety?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Did you feel so restless that you could not sit still?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Did you feel depressed?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Did you feel that everything was an effort?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Did you feel so sad that nothing could cheer you up?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. Did you feel worthless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### SECTION G: Your Neighbourhood

This next section asks about the neighbourhood and community where you live.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Not applicable – live in a remote/natural location</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. There is access to basic shopping facilities in my neighbourhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. There is access to basic services such as banks and medical clinics in my neighbourhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. There are playgrounds, parks or gyms close to my home or that I can get to easily.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neutral</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
</table>

4. There is access to close, affordable, regular public transport in my neighbourhood

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Don't know</th>
</tr>
</thead>
</table>

5. Which of the following things listed below are within walking distance or a short drive (within 1km) of where you live? (1km is usually a 5 minute drive or a 10 minute walk)

<table>
<thead>
<tr>
<th>Options</th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Cycling or walking path not on the road</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Cycle lane on the road</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Public oval</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. River</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Beach or waterfront</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Has your day to day travel been limited or restricted for any reason in the past 12 months?
   
   □ Yes  □ No (go to Question 7)

6a. Was your travel limited or restricted for any of the following reasons? (Tick all that apply)

   i. Because you didn’t have access to a motor vehicle when needed?  □   
   ii. No public transport was available in your local area  □   
   iii. Public transport didn’t go where you needed to go  □   
   iv. Public transport ran at the wrong time  □   
   v. Public transport was too expensive  □

6b. Did these transport limitations or difficulties you experienced make it hard for you to do any of the following?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th>Don’t need travel for this</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Look for or get to or from work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Get to studying (school) or training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Visit a doctor or health professional</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Participate in social or recreational activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7a. How much do the following statements describe your neighbourhood?

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Lots of empty or abandoned buildings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Lots of graffiti</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7b. How much do you agree with the following statements about your neighbourhood?

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>This is a clean neighbourhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>There is heavy traffic on my street</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. To what extent do you agree or disagree that it is a good thing for a society to be made up of people from different cultures.

- [ ] Strongly agree
- [ ] Disagree
- [ ] Agree
- [ ] Strongly disagree
- [ ] Neither agree or disagree
- [ ] Don't know (not sure)

9. How safe or unsafe do you feel when in the following situations:

<table>
<thead>
<tr>
<th></th>
<th>Very safe</th>
<th>Safe</th>
<th>Neither safe nor unsafe</th>
<th>Unsafe</th>
<th>Very unsafe</th>
<th>Never alone in this situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. At home by yourself during the day?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. At home by yourself after dark?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Walking in your local area alone during the day?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Walking in your local area alone after dark?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Travelling on public transport during the day?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Travelling on public transport after dark?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. How much do each of the following statements describe your neighbourhood?

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. In my neighbourhood there are fights</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. In my neighbourhood there is crime and/or drug selling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. In my neighbourhood, adults pay attention to what kids have to say</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. In my neighbourhood, kids can help decide when activities are provided or how they are run</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. I feel safe in my neighbourhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. There are lots of adults in my neighbourhood that I could talk to about something important</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. I'd like to get out of my neighbourhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. If I had to move, I would miss the neighbourhood I now live in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. I like my neighbourhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11. Which of the following activities available for people your age in your community? 

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Sports teams.</td>
<td>☐</td>
</tr>
<tr>
<td>B.</td>
<td>Scouting (Scouts, Cubs, Girl Scouts, Brownies, etc.).</td>
<td>☐</td>
</tr>
<tr>
<td>C.</td>
<td>Youth groups (boys’ and girls’ clubs, church groups, etc.).</td>
<td>☐</td>
</tr>
<tr>
<td>D.</td>
<td>Community service (visiting or helping people, environmental projects, fundraising for charity, service clubs).</td>
<td>☐</td>
</tr>
</tbody>
</table>
Appendix C: Victorian Adolescent Health and Wellbeing Survey Instrument – Male Version

In the male version of the survey for the youngest cohort, questions 44 and 45 in section D were worded as follows:

44. Have you begun to grow hair on your face?

45. Have you noticed a deepening of your voice?
The following questions were omitted from Section D of the survey administered in Catholic Schools unless an active parental consent process was used.

46. Have you ever had sex?
   □ No □ Yes
   If yes: (go to next section)
   If yes: how old were you when you first had sex?
   _____ Years and _______ Months old

47. When you have sex do you or your partner use?

   Condoms: □ Never □ Sometimes □ Most times
   Always

   Birth Control Pills: □ Never □ Sometimes □ Most times
   Always

   Some other contraceptive method: □ Never □ Sometimes □ Most times
   Always
Appendix E: IYDS Survey Instrument for the Youngest Cohort – Female Version

International Youth Development Study

2002 Student Survey

Grade 5 ~ Female

Centre for Adolescent Health
Melbourne, Australia

Social Development Research Group
Seattle, USA

Student ID #: ___________ Date: ___________
Instructions

1. This is not a test, so there are no right or wrong answers.

2. In order for this study to be helpful, it is important that you answer each question as thoughtfully and honestly as possible.

3. Each question will be read aloud and you will have time to decide which answer to choose. Please keep quiet so that everyone can hear and try to keep up with the reader. Please don't go ahead.

4. Please try to answer every question. If you decide not to answer a question, put your initials next to it so that we don't think you missed it by mistake.

5. All your answers are confidential. This means they will be seen only by the research team and will not be read by anyone connected with your school or your home.

6. All of the questions should be answered by circling the number, letter, or word in the answer spaces. If you don't find an answer that fits exactly, use the one that comes closest.

7. Make sure you circle only one answer for each question. If you change your mind about an answer, don't rub it out. Instead, draw an “X” through your old answer and circle your new answer.
Some of the questions have the following format:

1. How many times have you watched TV this week?
   A. None
   B. 1 or 2 times
   C. 3 or 4 times
   D. 5 or more times

Mark your choice by circling the letter (A, B, C, or D) that is next to the answer you want.

Other questions will look like this:

EXAMPLE:

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like to play sport.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

Please circle the letter of one of the four words that best describes how you feel about that sentence.

Mark (the big) YES! (Y) if you think the statement is definitely true for you.
Mark (the little) yes (y) if you think the statement is mostly true for you.
Mark (the little) no (n) if you think the statement is mostly not true for you.
Mark (the big) NO! (N) if you think the statement is definitely not true for you.

In the example above, the student marked yes because he or she thinks the statement is mostly true. (Please mark only one answer)

If you have any questions at any time, please raise your hand. Someone will come over and try to answer your question.

You will have the entire class period to complete the questionnaire. When you are finished, please remain at your desk and read or work quietly until the end of class. For those of you who are still working at the end of class, you will be told when it's time to stop. If you don't finish the entire questionnaire, that's okay.

You may now turn to the next page and we'll begin.
SECTION A: ABOUT YOU

This first section asks some general questions about you.

1. How old are you?
   __________ years old

2. What is your birth date?
   ___/___/___
   D D / M M / Y Y Y Y

   *For example, if your birthday is 3rd April, 1990, you would write: 03 / 04 / 1990.

3. What grade are you in?

   A. 4
   B. 5
   C. 6

4. What do you consider yourself to be? (Please circle all that apply):

   A. African
   B. Aboriginal or Torres Strait Islander
   C. Spanish/Hispanic/Latino
   D. Asian
   E. Pacific Islander
   F. Australian
   G. Other (please specify):  

   ______________________________________
5. Have you changed homes in the *past year*?
   A. Yes
   B. No

6. Have you changed schools in the *past year*?
   A. Yes
   B. No

7. How many times have you changed homes *since kindergarten*?
   A. Never
   B. 1 or 2 times
   C. 3 or 4 times
   D. 5 or 6 times
   E. 7 or more times

8. How many times have you changed schools *since kindergarten*?
   A. Never
   B. 1 or 2 times
   C. 3 or 4 times
   D. 5 or 6 times
   E. 7 or more times

9. How often do you attend religious services or activities?
   A. Never
   B. Rarely
   C. 1-2 times a month
   D. About once a week or more
SECTION B: SCHOOL EXPERIENCES

This next section is about your experiences at school.

10. Putting them all together, what were your marks like last year?

   A. Very good
   B. Good
   C. Average
   D. Poor
   E. Very poor

11. During the last four weeks, how many whole days of school have you missed because you skipped or "wagged"?

   A. None
   B. 1
   C. 2
   D. 3
   E. 4 - 5
   F. 6 - 10
   G. 11 or more

Please answer BIG YES!, little yes, little no, or BIG NO! for the following questions about your school.

<table>
<thead>
<tr>
<th>Question</th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. In my school, students have lots of chances to help decide things</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>like class activities and rules.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Teachers ask me to work on special classroom projects.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>14. My teacher(s) notice when I am doing a good job and let me know</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>about it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. There are lots of chances for students in my school to get involved</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>in sports, clubs, or other school activities outside of class.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>YES</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>16.</td>
<td>There are lots of chances for students in my school to talk with a teacher one-on-one.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>17.</td>
<td>I feel safe at my school.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>18.</td>
<td>The school lets my parents know when I have done something well.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>19.</td>
<td>My teachers praise me (tell me I’m doing well) when I work hard in school.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>20.</td>
<td>I have lots of chances to be part of class discussions or activities.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>21.</td>
<td>Are your school marks better than the marks of most students in your class?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
</tbody>
</table>

22. How often do you feel that the schoolwork you are assigned is meaningful and important?

A. Almost always  
B. Often  
C. Sometimes  
D. Rarely  
E. Never

23. How interesting are most of your school subjects to you?

A. Very interesting  
B. Quite interesting  
C. Fairly interesting  
D. Slightly boring  
E. Very boring

24. How important do you think the things you are learning in school are going to be for your later life?

A. Very important  
B. Quite important  
C. Fairly important  
D. Slightly important  
E. Not at all important
25. Now, thinking back over the past year in school, how often did you...  | Almost always | Often | Sometimes | Rarely | Never |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Enjoy being in school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>B. Hate being in school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>C. Try to do your best work in school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>D. Look forward to going to school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>E. Take part in sports, clubs, organisations, or other activities at school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
</tbody>
</table>

**SECTION C: YOUR FRIENDS & EXPERIENCES**

For this next set of questions, think of your four best friends (the friends you feel closest to). These questions will ask about things that have happened in the past year.

26. In the past year (12 months), how many of your best friends have...  | None of my friends | 1 of my friends | 2 of my friends | 3 of my friends | 4 of my friends |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoked cigarettes?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>B. Tried alcohol (like beer, wine or spirits) when their parents didn’t know about it?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>C. Used marijuana (pot, weed, grass)?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>D. Used other illegal drugs?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>E. Tried to do well in school?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>F. Been involved in sports, clubs, organisations, or other activities at school?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>G. Been suspended from school?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>H. Stolen something worth more than $10?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I. Been picked up or arrested by the police?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>J. Attacked someone with the idea of seriously hurting them?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Now we'd like to ask you about some things that you may or may not have done.

27. Have you ever:

<table>
<thead>
<tr>
<th></th>
<th>No, never</th>
<th>Yes, but not in the last year</th>
<th>Yes, 1 or 2 times in the last year</th>
<th>Yes, 3 or more times in the last year</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Smoked a cigarette, even just a puff?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B.</td>
<td>Had more than just a sip or two of an alcoholic drink (like beer, wine or spirits)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>C.</td>
<td>Gotten drunk?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>D.</td>
<td>Used marijuana (pot, wood, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>E.</td>
<td>Sniffed, breathed, or inhaled anything else in order to get high?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>F.</td>
<td>Used derbisol?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>G.</td>
<td>Used other illegal drugs?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>

28. Have you ever:

<table>
<thead>
<tr>
<th></th>
<th>No, never</th>
<th>Yes, but not in the last year</th>
<th>Yes, 1 or 2 times in the last year</th>
<th>Yes, 3 or more times in the last year</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Gotten back at another student by not letting them be in your group of friends?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B.</td>
<td>Told lies or started rumours about other students to make other kids not like them?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>C.</td>
<td>Been suspended from school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>D.</td>
<td>Been arrested?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>E.</td>
<td>Carried a weapon?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>F.</td>
<td>Stolen something worth more than $10?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>G.</td>
<td>Attacked someone with the idea of seriously hurting them?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>H.</td>
<td>Beat up someone so badly that they probably needed to see a doctor or nurse?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
29. Have you been bullied recently (teased or called names, had rumours spread about you, been deliberately left out of things, threatened physically, or actually hurt)?

A. No
B. Yes, less than once a week
C. Yes, about once a week
D. Yes, most days

30. How many times have you done the following things:

<table>
<thead>
<tr>
<th>Never</th>
<th>I’ve done it, but not in the past year</th>
<th>Less than once a month</th>
<th>About once a month</th>
<th>2 or 3 times a month</th>
<th>Once a week or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Done what feels good no matter what.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>B. Done something dangerous because someone dared you to do it.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>C. Done crazy things even if they are a little dangerous.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
</tbody>
</table>

The next questions are about your feelings and experiences.

31. How wrong do you think it is for someone your age to:

<table>
<thead>
<tr>
<th>Not wrong at all</th>
<th>A little bit wrong</th>
<th>Wrong</th>
<th>Very wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Stay away from school all day when their parents think they are at school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B. Steal something worth more than $10?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>C. Pick a fight with someone?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>D. Take a weapon to school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>E. Attack someone with the idea of seriously hurting them?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>F. Smoke cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>G. Drink beer, wine or spirits regularly (at least once or twice a month)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>H. Use marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>I. Use other illegal drugs?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
Please tell me how well each of the following statements describes you by answering BIG YES!, little yes, little no, or BIG NO!

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.</td>
<td>I ignore rules that get in my way.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>33.</td>
<td>It is all right to beat up people if they start the fight.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>34.</td>
<td>It is important to be honest with your parents, even if they become upset or you get punished.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>35.</td>
<td>I do the opposite of what people tell me, just to get them mad.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>36.</td>
<td>I think it is okay to take something without asking if you can get away with it.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>37.</td>
<td>I think sometimes it's okay to cheat at school.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>38.</td>
<td>It's important to think before you act.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
</tbody>
</table>

39. What are the chances you would be seen as cool if you:

<table>
<thead>
<tr>
<th></th>
<th>Very good chance</th>
<th>Pretty good chance</th>
<th>Some chance</th>
<th>Little chance</th>
<th>Very little or no chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Worked hard at school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>B.</td>
<td>Were involved in sports, clubs, organisations, or other activities at school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>C.</td>
<td>Smoked cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>D.</td>
<td>Began drinking alcoholic beverages regularly, that is, at least once or twice a month?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>E.</td>
<td>Used marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>F.</td>
<td>Carried a weapon?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
40. Do you think it hurts people…

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. To smoke one or more packs of cigarettes a day?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>B. To have one or two alcoholic drinks (like beer, wine or spirits) nearly every day?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>C. To try marijuana (pot, weed, grass) once or twice?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>D. To use marijuana (pot, weed, grass) regularly (at least once or twice a month)?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

The next set of questions asks you to imagine a situation. Even if you do not know for sure what you might do in that situation, please circle the answer that comes closest.

41. You're at a store with a friend. Your friend steals a magazine and says "Go ahead, take one while nobody's around".
   What would you do now?
   Would you...

   A. Ignore her
   B. Grab a magazine and leave the store
   C. Tell her to put the magazine back
   D. Act like it's a joke and ask her to put the magazine back

41a. Do you think you would handle this situation well?

   A. YES!
   B. yes
   C. no
   D. NO!
42. It's after school and you want to go to a friend's house. Your mum or dad says you can't go because their parents aren't home.
What would you do now?
Would you…
  A. Leave the house anyway
  B. Explain what you are going to do with your friends, tell your mum or dad when you'd get home, and ask if you can go out
  C. Not say anything and start watching TV
  D. Get into an argument with your mum or dad

42a. Do you think you would handle this situation well?
  A. YES!
  B. yes
  C. no
  D. NO!

43. You're walking home from school and a kid you don't know is walking towards you. He is about your size and he bumps you on purpose.
What would you say or do?
Would you…
  A. Push the person back
  B. Say "Excuse me" and keep on walking
  C. Say "Watch where you're going" and keep on walking
  D. Swear at the person and walk away

43a. Do you think you would handle this situation well?
  A. YES!
  B. yes
  C. no
  D. NO!
44. You are at a party at someone's house, and one of your friends offers you a drink containing alcohol.
What would you say or do?
Would you...

A. Drink it
B. Tell your friend "No thanks, I don't drink" and suggest that you and your friend go and do something else
C. Just say "No, thanks" and walk away
D. Make up a good excuse, tell your friend you had something else to do, and leave

44a. Do you think you would handle this situation well?

A. YES!
B. yes
C. no
D. NO!

Please indicate how true each of the following statements is for you by circling BIG YES!, little yes, little no, or BIG NO!

<table>
<thead>
<tr>
<th>Statement</th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>45. I like to see how much I can get away with.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>46. I find it hard to keep concentrating on tasks.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>47. I get distracted easily when I'm doing work at school or other tasks.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>48. I rush into things, starting before I know what to do.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>49. I answer without thinking about it first.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>
### SECTION D: YOUR FEELINGS

Please indicate how true each of the following statements has been for you during the past 30 days (1 month).

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>50. In the past 30 days (1 month)</strong></td>
<td><strong>True</strong></td>
<td><strong>Sometimes true</strong></td>
</tr>
<tr>
<td>A. I felt miserable or unhappy.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>B. I felt that I had a number of good qualities.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>C. I didn’t enjoy anything at all.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>D. I was very restless (couldn’t sit still or quiet).</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>E. I felt so tired I just sat around and did nothing.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>F. I felt I was no good any more.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>G. I was able to do things as well as most people.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>H. I cried a lot.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>I. I found it hard to think properly or concentrate.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>J. I hated myself.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>K. I was a bad person.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>L. I took a positive attitude towards myself.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>M. I felt lonely.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>N. I thought nobody really loved me.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>O. I generally felt satisfied with myself.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>P. I thought I could never be as good as other kids.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Q. I did everything wrong.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>R. I felt I am a person of worth, as good as others.</td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>
Please read Section E by yourself and fill in the answers at your own pace.

SECTION E:
PERSONAL EXPERIENCES

The next questions are about changes that may be happening to your body. These changes normally happen to different people at different ages. If you are unsure of which answer to choose, just give your best guess.

51. Would you say that your growth in height (growth spurt):
   
   A. Has not started yet  
   B. Has barely started  
   C. Has definitely started  
   D. Seems complete  

52. And how about the growth of your body hair? (“Body hair” means hair any place other than your head, such as under your arms). Would you say that your body hair growth:

   A. Has not started yet  
   B. Has barely started  
   C. Has definitely started  
   D. Seems complete  

53. Have you noticed any skin changes, especially pimples?

   A. Has not started yet  
   B. Has barely started  
   C. Has definitely started  
   D. Seems complete
54. Have you noticed that your breasts have begun to grow?
   A. Has not started yet
   B. Has barely started
   C. Has definitely started
   D. Seems complete

55. Have you begun to menstruate (started to have your period)?
   A. Yes  
   B. No  
   55a. If yes, how old were you when you started to menstruate?
   _______ Years and _______ Months Old

56a. All young people have changes to their bodies as they become adults. Look at the pictures on the next page. Please choose the picture that looks most like your body now.
   A. Picture 1
   B. Picture 2
   C. Picture 3
   D. Picture 4
   E. Picture 5
The breasts are flat.

The breasts form small mounds, and the nipple and the surrounding darker part is larger than picture 1.

The breasts form larger mounds than in picture 2, but the nipple and surrounding darker part does not stick out from the breast.

The nipple and the surrounding darker part make up a mound that does stick out from the breast.

Only the nipple sticks out beyond the breast.
56b. Again, please choose the picture on this page that looks most like your body now.

A. Picture 1
B. Picture 2
C. Picture 3
D. Picture 4
E. Picture 5

- Picture 1: No hair.
- Picture 2: Very little hair, mostly straight or a bit curly, and light in colour.
- Picture 3: Hair is thicker and more curly and is getting darker.
- Picture 4: The hair is as dark and curly as an adult but with none on inner thighs.
- Picture 5: More hair with some hair on inner thighs.
Congratulations! You are more than half way through...

SECTIO N F: YOUR FAMILY

The next questions ask about your family. Please think about whoever you consider your family to be.

57. My parents notice when I am doing a good job and let me know about it. How often does this happen?
   A. All of the time
   B. Often
   C. Sometimes
   D. Never or almost never

58. How often do your parents tell you they’re proud of you for something you’ve done?
   A. All of the time
   B. Often
   C. Sometimes
   D. Never or almost never

Please answer BIG YES!, little yes, little no, or BIG NO! to the following statements about your family.

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>yes</th>
<th>no</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>59. Do you feel very close to your mother?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>60. Do you share your thoughts and feelings with your mother?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>61. Do you enjoy spending time with your mother?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>62. Do you feel very close to your father?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>63. Do you share your thoughts and feelings with your father?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>64. Do you enjoy spending time with your father?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>65. My parents ask me what I think before most family decisions affecting me are made.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>66. If I had a personal problem, I could ask my mum or dad for help.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>67.</td>
<td>My parents give me lots of chances to do fun things with them.</td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>68.</td>
<td>My parents ask if I’ve gotten my homework done.</td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>69.</td>
<td>My parents would know if I did not come home on time.</td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>70.</td>
<td>The rules in my family are clear.</td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>71.</td>
<td>When I am not at home, one of my parents knows where I am and who I am with.</td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>72.</td>
<td>My parents want me to call if I’m going to be late getting home.</td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>73.</td>
<td>My family has clear rules about alcohol and drug use.</td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>74.</th>
<th>How wrong do your parents feel it would be for you to:</th>
<th>Not wrong</th>
<th>A little bit wrong</th>
<th>Wrong</th>
<th>Very wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Drink beer, wine or spirits regularly (at least once or twice a month)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>B.</td>
<td>Smoke cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>C.</td>
<td>Use marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>D.</td>
<td>Draw graffiti, or write things or draw pictures on buildings or other property (without the owner’s permission)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>E.</td>
<td>Steal something worth more than $10?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>F.</td>
<td>Pick a fight with someone?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>75.</th>
<th>Have any of your brothers or sisters ever:</th>
<th>Yes</th>
<th>No</th>
<th>I don’t have any brothers or sisters</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Drunk alcohol (like beer, wine or spirits)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B.</td>
<td>Used marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>C.</td>
<td>Smoked cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>D.</td>
<td>Taken a weapon to school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>E.</td>
<td>Been suspended or expelled from school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
76. Has anyone in your family ever had a severe (serious) alcohol or drug problem?
   A. Yes
   B. No

<table>
<thead>
<tr>
<th>Year</th>
<th>Yes</th>
<th>No</th>
<th>N</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>78</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>79</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>80</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>81</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>82</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

SECTION G: YOUR NEIGHBOURHOOD

Please answer the following questions about the neighbourhood and community where you live.

83. How much do each of the following statements describe your neighbourhood?
   A. Lots of empty or abandoned buildings
   B. Lots of graffiti
   C. Fights
   D. Crime and/or drug selling

<table>
<thead>
<tr>
<th>Year</th>
<th>Yes</th>
<th>No</th>
<th>N</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>83</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>84</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>85</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>86</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>
84. Which of the following activities for people your age are available in your community?  

|   | Yes | No |
|---|-----|----|---|---|
| A. Sports teams | Y   | N  |   |   |
| B. Scouting (Boy Scouts, Cubs, Girl Scouts, Brownies, etc.) | Y   | N  |   |   |
| C. Youth groups (boys' and girls' clubs, church groups) | Y   | N  |   |   |
| D. Community service (visiting or helping people, environmental projects, fundraising for charity, service clubs) | Y   | N  |   |   |

85. There are lots of adults in my neighbourhood I could talk to about something important.  

|   | YES | yes | no | NO |
|---|-----|-----|----|----|---|
|  | Y   | y   | n  | N  |   |

86. There are people in my neighbourhood who are proud of me when I do something well.  

|   | YES | yes | no | NO |
|---|-----|-----|----|----|---|
|  | Y   | y   | n  | N  |   |

87. There are people in my neighbourhood who encourage me to do my best.  

|   | YES | yes | no | NO |
|---|-----|-----|----|----|---|
|  | Y   | y   | n  | N  |   |

88. My neighbours notice when I am doing a good job and let me know about it.  

|   | YES | yes | no | NO |
|---|-----|-----|----|----|---|
|  | Y   | y   | n  | N  |   |

89. In my neighbourhood, kids can help decide which activities are provided or how they are run.  

|   | YES | yes | no | NO |
|---|-----|-----|----|----|---|
|  | Y   | y   | n  | N  |   |

90. In my neighbourhood, adults pay attention to what kids have to say.  

|   | YES | yes | no | NO |
|---|-----|-----|----|----|---|
|  | Y   | y   | n  | N  |   |

91. If you wanted to get some cigarettes, how easy would it be for you to get some?  

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

92. If you wanted to get some alcohol (like beer, wine or spirits), how easy would it be for you to get some?  

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

93. If you wanted to get some marijuana (pot, weed, grass), how easy would it be for you to get some?  

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

94. If you wanted to get other illegal drugs, how easy would it be for you to get some?  

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

95. If you wanted to get a weapon, how easy would it be for you to get one?  

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>---</td>
<td>------</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>96. If a kid drank some alcohol (like beer, wine or spirits) in your neighbourhood, would he or she be caught by the police?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>97. If a kid used marijuana in your neighbourhood, would he or she be caught by the police?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>98. If a kid carried a weapon in your neighbourhood, would he or she be caught by the police?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>None</th>
<th>1 adult</th>
<th>2 adults</th>
<th>3 or 4 adults</th>
<th>5 or more adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>99. How many adults (over 21) do you know personally who, in the past year, have...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Gotten drunk or high?</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3-4</td>
<td>5+</td>
</tr>
<tr>
<td>B. Used marijuana (pot, weed, grass) or other illegal drugs?</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3-4</td>
<td>5+</td>
</tr>
<tr>
<td>C. Sold drugs?</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3-4</td>
<td>5+</td>
</tr>
<tr>
<td>D. Done other things that could get them in trouble with the police like stealing, selling stolen goods, beating someone up, etc.?</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3-4</td>
<td>5+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Not wrong at all</th>
<th>A little bit wrong</th>
<th>Wrong</th>
<th>Very wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>100. How wrong would most adults (over 21) in your neighbourhood think it is for kids your age to:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Smoke cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>B. Drink alcohol?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>C. Use marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
Please answer BIG YES!, little yes, little no, or BIG NO! to the following statements about your neighbourhood.

<table>
<thead>
<tr>
<th>Statement</th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>101. I feel safe in my neighbourhood.</td>
<td>y</td>
<td>n</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>102. I’d like to get out of my neighbourhood.</td>
<td>y</td>
<td>n</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>103. If I had to move, I would miss the neighbourhood I now live in.</td>
<td>y</td>
<td>n</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>104. I like my neighbourhood.</td>
<td>y</td>
<td>n</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

SECTION H: SURVEY SUMMARY

The last two questions ask about this survey as a whole.

105. How important were these questions to you?

   A. Very important
   B. Important
   C. Fairly important
   D. Not too important

106. How honest were you in filling out this survey?

   A. I was honest all of the time
   B. I was honest most of the time
   C. I was honest some of the time
   D. I was honest once in a while
   E. I was not honest at all
THANK YOU!!
We really appreciate you filling out this survey.
And...we'd love to get your feedback.

Please take a moment to tell us what you thought about the survey by writing your comments in the space provided below:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

When you are finished with this page, please look through your survey booklet and make sure you didn’t skip any questions. Then, please sit quietly until we collect your survey booklet. Thank you.
Appendix F: IYDS Survey Instrument for the Middle and Oldest Cohorts – Female Version

International Youth Development Study

2002 Student Survey

Year 7 & 9 ~ Female

Centre for Adolescent Health
Melbourne, Australia

Social Development Research Group
Seattle, USA

Student ID #: _________ Date: _________
Instructions

1. This is not a test, so there are no right or wrong answers.

2. In order for this study to be helpful, it is important that you answer each question as thoughtfully and honestly as possible.

3. Please try to answer every question. If you decide not to answer a question, put your initials next to it so that we don't think you missed it by mistake.

4. All your answers are confidential. This means they will be seen only by the research team and will not be read by anyone connected with your school or your home.

5. All of the questions should be answered by circling the number, letter, or word in the answer spaces. If you don’t find an answer that fits exactly, use the one that comes closest.

6. Make sure to circle only one answer for each question. If you change your mind about an answer, don’t rub it out. Instead, draw an “X” through your old answer and circle your new answer.
Some of the questions have the following format:

1. How many times have you watched TV this week?
   A. None
   B. 1 or 2 times
   C. 3 or 4 times
   D. 5 or more times

Mark your choice by circling the letter (A, B, C, or D) that is next to the answer you want.

Other questions will look like this:

**EXAMPLE:**

<table>
<thead>
<tr>
<th>I like to play sport.</th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

Please circle the letter of one of the four words that best describes how you feel about that sentence.

Mark (the big) YES! (Y) if you think the statement is **definitely true** for you.
Mark (the little) yes (y) if you think the statement is **mostly true** for you.
Mark (the little) no (n) if you think the statement is **mostly not true** for you.
Mark (the big) NO! (N) if you think the statement is **definitely not true** for you.

In the example above, the student marked yes because he or she thinks the statement is **mostly true**. (Please mark only one answer)

If you have any questions at any time, please raise your hand. Someone will come over and try to answer your question.

You will have the entire class period to complete the questionnaire. When you are finished, please remain at your desk and read or work quietly until the end of class. For those of you who are still working at the end of class, you will be told when it's time to stop. If you don't finish the entire questionnaire, that's okay.

You may now turn to the next page and begin.
SECTION A: ABOUT YOU

This first section asks some general questions about you.

1. How old are you?
   
   __________ years old

2. What is your birth date?

   __ / __ / ___ ___ ___
   D D / M M / Y Y Y Y

   *For example, if your birthday is 3rd April, 1988, you would write: 03/04/1988.

3. What year are you in?
   
   A. 6
   B. 7
   C. 8
   D. 9
   E. 10

4. What do you consider yourself to be? (Please circle all that apply):
   
   A. African
   B. Aboriginal or Torres Strait Islander
   C. Spanish/Hispanic/Latino
   D. Asian
   E. Pacific Islander
   F. Australian
   G. Other (please specify):
5. What is the highest level of education your mother completed?
   A. Completed primary school or less
   B. Some high school
   C. Completed Year 12
   D. TAFE certificate/apprenticeship
   E. Incomplete college or university degree
   F. Completed 3 or 4 year college or university degree
   G. Postgraduate degree (MA/PhD)
   H. Don’t know
   I. Doesn’t apply to me

6. What is the highest level of education your father completed?
   A. Completed primary school or less
   B. Some high school
   C. Completed Year 12
   D. TAFE certificate/apprenticeship
   E. Incomplete college or university degree
   F. Completed 3 or 4 year college or university degree
   G. Postgraduate degree (MA/PhD)
   H. Don’t know
   I. Doesn’t apply to me

7. Have you changed homes in the past year?
   A. Yes
   B. No

8. Have you changed schools (including changing from primary to secondary school) in the past year?
   A. Yes
   B. No
9. How many times have you changed schools (including changing from primary to secondary school) since kindergarten?
   A. Never
   B. 1 or 2 times
   C. 3 or 4 times
   D. 5 or 6 times
   E. 7 or more times

10. How many times have you changed homes since kindergarten?
    A. Never
    B. 1 or 2 times
    C. 3 or 4 times
    D. 5 or 6 times
    E. 7 or more times

11. How often do you attend religious services or activities?
    A. Never
    B. Rarely
    C. 1-2 times a month
    D. About once a week or more

**SECTION B: SCHOOL EXPERIENCES**

This next section asks about your experiences in school.

12. Putting them all together, what were your marks like last year?
    A. Very good
    B. Good
    C. Average
    D. Poor
    E. Very poor
13. During the last four weeks how many whole days of school have you missed because you skipped or “wagged”?

A. None  
B. 1  
C. 2  
D. 3  
E. 4-5  
F. 6-10  
G. 11 or more

Please answer the following items about school by answering BIG YES!, little yes, little no, or BIG NO! to each of the following statements.

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. In my school, students have lots of chances to help decide things like class activities and rules.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>15. Teachers ask me to work on special classroom projects.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>16. My teachers notice when I am doing a good job and let me know about it.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>17. There are lots of chances for students in my school to get involved in sports, organisations, clubs, or other school activities outside of class.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>18. There are lots of chances for students in my school to talk with a teacher one-on-one.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>19. I feel safe at my school.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>20. The school lets my parents know when I have done something well.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>21. My teachers praise me (tell me I’m doing well) when I work hard in school.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>22. I have lots of chances to be part of class discussions or activities.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>23. Are your school marks better than the marks of most students in your class?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>
24. How often do you feel that the schoolwork you are assigned is meaningful and important?
   A. Almost always
   B. Often
   C. Sometimes
   D. Seldom
   E. Never

25. How interesting are most of your school subjects to you?
   A. Very interesting
   B. Quite interesting
   C. Fairly interesting
   D. Slightly boring
   E. Very boring

26. How important do you think the things you are learning in school are going to be for your later life?
   A. Very important
   B. Quite important
   C. Fairly important
   D. Slightly important
   E. Not at all important

27. Now, thinking back over the past year (12 months) in school, how often did you...

<table>
<thead>
<tr>
<th></th>
<th>Almost Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Enjoy being in school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>B. Hate being in school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>C. Try to do your best work in school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
</tbody>
</table>
These next few questions are about your school’s rules and procedures. Please think about which things are most likely to happen at your school in each of the following situations. Please circle all that apply.

28. If a student was found smoking cigarettes at school, which of the following would most likely happen? (circle all that apply)
   A. He or she would be talked to by a teacher about the dangers of smoking cigarettes
   B. He or she would be suspended
   C. He or she would be expelled
   D. The police would be called

29. If a student was found drinking alcohol at school, which of the following would most likely happen? (circle all that apply)
   A. He or she would be talked to by a teacher about the dangers of drinking alcohol
   B. He or she would be suspended
   C. He or she would be expelled
   D. The police would be called

30. If a student was found using marijuana at school, which of the following would most likely happen? (circle all that apply)
   A. He or she would be talked to by a teacher about the dangers of using marijuana
   B. He or she would be suspended
   C. He or she would be expelled
   D. The police would be called
31. If a student was found using other illegal drugs at school, which of the following would most likely happen? (Circle all that apply)
   A. He or she would be talked to by a teacher about the dangers of using drugs
   B. He or she would be suspended
   C. He or she would be expelled
   D. The police would be called

Please tell us how well each of the following statements describe your school by answering BIG YES!, little yes, little no, or BIG NO!

<table>
<thead>
<tr>
<th>Statement</th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. Many students smoke on the school grounds without getting caught.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>33. Many students drink alcohol on the school grounds without getting caught.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>34. We are taught to say no to alcohol.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>35. We are taught how to use alcohol safely.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>
**SECTION C: YOUR FRIENDS & EXPERIENCES**

For this next set of questions, think of your four best friends (the friends you feel closest to). These questions will ask about things that have happened in the past year.

36. In the past year (12 months), how many of your best friends have:

<table>
<thead>
<tr>
<th>A. Smoked cigarettes?</th>
<th>None of my friends</th>
<th>1 of my friends</th>
<th>2 of my friends</th>
<th>3 of my friends</th>
<th>4 of my friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Tried alcohol (like beer, wine or spirits) when their parents didn't know about it?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>C. Used marijuana (pot, weed, grass)?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>D. Used other illegal drugs (like cocaine, heroin, LSD/&quot;acid&quot;, or amphetamines/&quot;speed&quot;)?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>E. Tried to do well in school?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>F. Been involved in sports, clubs, organisations, or other activities at school?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>G. Been suspended from school?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>H. Carried a weapon?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I. Stolen something worth more than $10?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>J. Sold illegal drugs?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>K. Stolen or tried to steal a motor vehicle such as a car or motorcycle?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>L. Been arrested?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>M. Dropped out of school?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>N. Been members of a gang?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>O. Attacked someone with the idea of seriously hurting them?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
This next section asks you about some things that you may or may not have done. Circle the answer that best describes you.

<table>
<thead>
<tr>
<th>37. If you have, how old were you when you first:</th>
<th>Never have</th>
<th>10 or under</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17 or older</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoked a cigarette, even just a puff?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>B. Had more than just a sip or two of an alcoholic beverage (like beer, wine or spirits)?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>C. Bogan drinking alcoholic beverages regularly, that is, at least once or twice a month?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>D. Used marijuana (pot, weed, grass)?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>E. Got suspended from school?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>F. Got arrested?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>G. Carried a handgun?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>H. Carried a weapon?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>I. Stole something worth more than $10?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>J. Attacked someone with the idea of seriously hurting them?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>K. Belonged to a gang?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>L. Sold illegal drugs?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>M. Stole or tried to steal a motor vehicle such as a car or motorcycle?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>N. Wore drunk or high at school?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>O. Beat up someone so badly they probably needed to see a doctor or nurse?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
<tr>
<td>P. Threatened someone with a weapon?</td>
<td>Never have</td>
<td>≤10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17+</td>
</tr>
</tbody>
</table>
38. How many times have you:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10-19 times</th>
<th>20-29 times</th>
<th>30-39 times</th>
<th>40 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Done crazy things, even if they are a little dangerous.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>Done something dangerous because someone dared you to do it.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>Done what feels good no matter what.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td></td>
</tr>
</tbody>
</table>

39. Have you ever belonged to a gang?
A. Yes
B. No

40. If you have belonged to a gang, did that gang have a name?
A. Yes
B. No
C. I have never belonged to a gang

For this next set of questions, please think only about the past year and circle the answer that best describes you. If you haven’t done the activity in the past year, please circle “0”.

41. How many times in the past year (12 months) have you:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10-19 times</th>
<th>20-29 times</th>
<th>30-39 times</th>
<th>40 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Looked forward to going to school?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>B.</td>
<td>Been involved in sports, clubs, organisations, or other activities at school?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>C.</td>
<td>Gotten back at another student by not letting them be in your group of friends?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>D.</td>
<td>Told lies or started rumors about other students to make other kids not like them?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
</tbody>
</table>
41. (Cont’d) How many times in the past year (12 months) have you:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10 to 19 times</th>
<th>20 to 29 times</th>
<th>30 to 39 times</th>
<th>40 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.</td>
<td>Been suspended from school?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>F.</td>
<td>Carried a handgun?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>G.</td>
<td>Carried a weapon?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>H.</td>
<td>Stolen something worth more than $10?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>I.</td>
<td>Sold illegal drugs?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>J.</td>
<td>Stolen or tried to steal a motor vehicle such as a car or motorcycle?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>K.</td>
<td>Been arrested?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>L.</td>
<td>Attacked someone with the idea of seriously hurting them?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>M.</td>
<td>Been drunk or high at school?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>N.</td>
<td>Taken a handgun to school?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>O.</td>
<td>Beat up someone so badly that they probably needed to see a doctor or nurse?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
<tr>
<td>P.</td>
<td>Threatened someone with a weapon?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
</tr>
</tbody>
</table>

42. Have you been bullied recently (teased or called names, had rumours spread about you, been deliberately left out of things, threatened physically, or actually hurt)?

A. No
B. Yes, less than once a week
C. Yes, about once a week
D. Yes, most days
This next set of questions will ask you to imagine a situation. Even if you do not know for sure what you might do in that situation, please circle the answer that comes closest.

43. You're looking at CDs in a music store with a friend. You look up and see her slip a CD under her coat. She smiles and says, "Which one do you want? Go ahead, take it while nobody's around". There is nobody in sight, no employees and no other customers.

What would you do now?
Would you…
A. Ignore her
B. Grab a CD and leave the store
C. Tell her to put the CD back
D. Act like it's a joke and ask her to put the CD back

43a. Do you think you would handle this situation well?
A. YES!
B. yes
C. no
D. NO!

44. It's 8:00 on a weeknight and you are about to go over to a friend's home when your mum or dad asks you where you are going. You say, "Oh, just going to go hang out with some friends." Your mum or dad says, "No, you'll just get into trouble if you go out. Stay home tonight".

What would you do now?
Would you…
A. Leave the house anyway
B. Explain what you are going to do with your friends, tell your mum or dad when you'd get home, and ask if you can go out
C. Not say anything and start watching TV
D. Get into an argument with your mum or dad
44a. Do you think you would handle this situation well?
   A. YES!
   B. yes
   C. no
   D. NO!

45. You are visiting another part of town, and you don’t know any of the people your age there. You are walking down the street, and some teenager you don’t know is walking toward you. He is about your size, and as he is about to pass you, he deliberately bumps into you and you almost lose your balance.

What would you say or do?
Would you…
   A. Push the person back
   B. Say “Excuse me” and keep on walking
   C. Say “Watch where you’re going” and keep on walking
   D. Swear at the person and walk away

45a. Do you think you would handle this situation well?
   A. YES!
   B. yes
   C. no
   D. NO!

46. You are at a party at someone’s house, and one of your friends offers you a drink containing alcohol.

What would you say or do?
Would you…
   A. Drink it
   B. Tell your friend, “No thanks, I don’t drink” and suggest that you and your friend go and do something else
   C. Just say “No, thanks” and walk away
   D. Make up a good excuse, tell your friend you had something else to do, and leave
46a. Do you think you would handle this situation well?
   A. YES!
   B. yes
   C. no
   D. NO!

SECTION D: YOUR OPINIONS

Next, please give us your opinion about the following statements.

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>47. It is important to be honest with your parents, even if they become upset or you get punished.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>48. It's important to think before I act.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>49. I think sometimes it's okay to cheat at school.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>50. I think it is okay to take something without asking if you can get away with it.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>51. It is all right to beat up people if they start the fight.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

52. What are the chances you would be seen as cool if you:

<table>
<thead>
<tr>
<th></th>
<th>Very good chance</th>
<th>Pretty good chance</th>
<th>Some chance</th>
<th>Little chance</th>
<th>Very little or no chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Worked hard at school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>B. Were involved in sports, clubs, organisations, or other activities at school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>C. Smoked cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>D. Began drinking alcoholic beverages regularly, that is, at least once or twice a month?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>E. Used marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>F. Carried a weapon?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
</tbody>
</table>
53. **How wrong do you think it is for someone your age to:**

<table>
<thead>
<tr>
<th></th>
<th>Not wrong at all</th>
<th>A little bit wrong</th>
<th>Wrong</th>
<th>Very wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoke cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>B. Drink beer or wine regularly?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>C. Drink spirits regularly?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>D. Use marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>E. Use other illegal drugs (like cocaine, heroin, LSD/“acid”, or amphetamines/“speed”)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>F. Stay away from school all day when their parents think they are at school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>G. Steal something worth more than $10?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>H. Pick a fight with someone?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>I. Attack someone with the idea of seriously hurting them?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>J. Take a weapon to school?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

54. **How much do you think people risk harming themselves (physically or in other ways) if they:**

<table>
<thead>
<tr>
<th></th>
<th>No risk</th>
<th>Slight risk</th>
<th>Moderate risk</th>
<th>Great risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoke one or more packs of cigarettes a day?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>B. Try marijuana (pot, weed, grass) once or twice?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>C. Use marijuana (pot, weed, grass) regularly?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>D. Take one or two drinks of an alcoholic beverage (like beer, wine or spirits) nearly every day?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
Sometimes we don’t know what we will do as adults, but we may have an idea. Please tell us how true these statements may be for you:

55. When I am an adult:

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I will smoke cigarettes.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>B. I will drink beer, wine or spirits.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>C. I will use marijuana (pot, weed, grass).</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

SECTION E: YOUR FEELINGS

Please tell us how true each of the following statements is for you by answering BIG YES!, little yes, little no, or BIG NO!

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>56. I do the opposite of what people tell me, just to get them mad.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>57. I ignore rules that get in my way.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>58. I like to see how much I can get away with.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>59. I find it hard to keep concentrating on tasks.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>60. I rush into things, starting before I know what to do.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>61. I answer without thinking about it first.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>62. I get distracted easily when I’m doing work at school or other tasks.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>63. I know how to relax when I feel tense.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>64. I am always able to keep my feelings under control.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>65. I know how to calm down if I am feeling nervous.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>66. I control my temper when people are angry with me.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>
67. When I have a problem...

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>B.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>C.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>D.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

Please indicate how true each of the following statements has been for you during the past 30 days (1 month):

68. In the past 30 days:

<table>
<thead>
<tr>
<th></th>
<th>True</th>
<th>Sometimes true</th>
<th>Not true</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>C.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>D.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>E.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>F.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>G.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>H.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>I.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>J.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>K.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>L.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>M.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>N.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>O.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>P.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
68. (Cont’d). In the past 30 days:

<table>
<thead>
<tr>
<th>Q. I did everything wrong.</th>
<th>True</th>
<th>Sometimes true</th>
<th>Not true</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. I felt I am a person of worth, as good as others.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>

69. In the past year, have you ever deliberately hurt yourself or done anything that you knew might have harmed you or even killed you? (Please circle yes or no below.)

A. No

IF YOU ANSWERED NO, PLEASE SKIP TO Question #70 on the next page.

B. Yes

69a. IF YOU ANSWERED YES, what was it that you did?

69b. Did this result in an injury or overdose that had to be treated by a doctor or nurse?
   A. Yes
   B. No

*Since this is a very serious matter, it is important that you talk to your doctor or someone else about this.
SECTION F: TOBACCO, ALCOHOL, & OTHER DRUGS

The next section asks about your experience with tobacco, alcohol, and other drugs. *Remember, your answers are confidential.*

70. Have you ever smoked cigarettes?
   A. Never
   B. Once or twice
   C. Once in a while but not regularly
   D. Regularly in the past
   E. Regularly now

71. How frequently have you smoked cigarettes during the past 30 days?
   A. Not at all
   B. Less than one cigarette per day
   C. 1-5 cigarettes per day
   D. 6-9 cigarettes per day
   E. 10-19 cigarettes per day
   F. 20-29 cigarettes per day
   G. 30-39 cigarettes per day
   H. 40 or more cigarettes per day

72. Think back over the last two weeks. How many times have you had five or more alcoholic drinks in a row?
   A. None
   B. Once
   C. Twice
   D. 3-5 times
   E. 6-9 times
   F. 10 or more times
For the next group of questions, please think only about the last 30 days. If you haven’t used the drug in the last 30 days, please circle “0”.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10-19 times</th>
<th>20-29 times</th>
<th>30-39 times</th>
<th>40 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Had more than just a few sips of an alcoholic beverage (like beer, wine or spirits)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>B. Used marijuana (pot, weed, grass)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>C. Used LSD (acid, trips, tabs) or other psychedelics?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>D. Used cocaine or crack?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>E. Sniffed glue, breathed the contents of an aerosol spray can, or inhaled other gases or sprays, in order to get high?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>F. Used stimulants (speed, amphetamines, uppers, meth, crystal, crank)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>G. Used ecstasy (XTC, E, X, MDMA, eccies, dove)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>H. Used heroin (Bomb, H, Smack, Junk)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>I. Used derbisol?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
<tr>
<td>J. Used other illegal drugs?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
<td></td>
</tr>
</tbody>
</table>
Now for this next group of questions, please think about your entire lifetime. Again, if you haven’t used the drug in your lifetime, you’ll circle “0” for that question.

<table>
<thead>
<tr>
<th>74.</th>
<th>In your lifetime, on how many occasions (if any) have you:</th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10-19 times</th>
<th>20-29 times</th>
<th>30-39 times</th>
<th>40 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Had more than just a few sips of an alcoholic beverage (like beer, wine or spirits)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>B.</td>
<td>Used marijuana (pot, weed, grass)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>C.</td>
<td>Used LSD (acid, trips, tabs) or other psychedelics?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>D.</td>
<td>Used cocaine or crack?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>E.</td>
<td>Sniffed glue, breathed the contents of an aerosol spray can, or inhaled other gases or sprays, in order to get high?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>F.</td>
<td>Used stimulants (speed, amphetamines, uppers, meth, crystal, crank)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>G.</td>
<td>Used ecstasy (XTC, E, X, MDMA, eccies, dove)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>H.</td>
<td>Used heroin (Bomb, H, Smack, Junk)?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>I.</td>
<td>Used ketamine?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>J.</td>
<td>Used other illegal drugs?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
</tbody>
</table>

75. Have you had any alcohol in the past year (more than just a few sips)?

A. Yes ➡️ CONTINUE TO ANSWER THE QUESTIONS ON THE NEXT PAGE

B. No ➡️ SKIP TO QUESTION #79 (on page 25)
76. When drinking alcohol over the past year, have you ever found that you were not able to stop drinking once you had started?
   A. No, never
   B. Yes, 1 or 2 times
   C. Yes, 3 to 5 times
   D. Yes, 6 to 9 times
   E. Yes, 10 to 19 times
   F. Yes, 20 to 29 times
   G. Yes, 30 to 39 times
   H. Yes, 40 or more times

77. Over the past year, how often has your use of alcohol caused you to...

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>1 or 2 times</th>
<th>3 to 5 times</th>
<th>6 to 9 times</th>
<th>10-19 times</th>
<th>20-29 times</th>
<th>30-39 times</th>
<th>40+ times</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Have trouble at school the next day?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>B. Get into arguments with your family?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>C. Get injured or to have an accident?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>D. Become violent and get into a fight?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>E. Have sex with someone which you later regretted?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
<tr>
<td>F. Get so drunk you were sick or passed out?</td>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
<td>6-9</td>
<td>10-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40+</td>
</tr>
</tbody>
</table>

78. How often during the last year have you been unable to remember what happened the night before because you had been drinking?
   A. Never
   B. 1 or 2 times
   C. 3 to 5 times
   D. 6 to 9 times
   E. 10 to 19 times
   F. 20 to 29 times
   G. 30 to 39 times
   H. 40 or more times
SECTION G: PERSONAL EXPERIENCES

The next questions are about changes that may be happening to your body. These changes normally happen to different people at different ages. If you are unsure of which answer to choose, just give your best guess.

79. Would you say that your growth in height (growth spurt):
   A. Has not started yet
   B. Has barely started
   C. Has definitely started
   D. Seems complete

80. And how about the growth of your body hair? ("Body hair" means hair any place other than your head, such as under your arms). Would you say that your body hair growth:
   A. Has not started yet
   B. Has barely started
   C. Has definitely started
   D. Seems complete

81. Have you noticed any skin changes, especially pimples?
   A. Has not started yet
   B. Has barely started
   C. Has definitely started
   D. Seems complete

82. Have you noticed that your breasts have begun to grow?
   A. Has not started yet
   B. Has barely started
   C. Has definitely started
   D. Seems complete
83. Have you begun to menstruate (started to have your period)?

A. Yes → 83a. If yes, how old were you when you started to menstruate?
   ______ Years and ______ Months Old

B. No

The next two questions are about something that not everyone has experienced. Please remember, your answers are confidential.

84. Have you ever had sex?

A. Yes → 84a. If yes, how old were you when you first had sex?
   ______ Years and ______ Months Old

B. No

85a. All young people have changes to their bodies as they become adults. Look at the pictures on the following page. Please choose the picture that looks most like your body now.

A. Picture 1
B. Picture 2
C. Picture 3
D. Picture 4
E. Picture 5
Picture 1
The breasts are flat.

Picture 2
The breasts form small mounds, and the nipple and the surrounding darker part is larger than picture 1.

Picture 3
The breasts form larger mounds than in picture 2, but the nipple and surrounding darker part does not stick out from the breast.

Picture 4
The nipple and the surrounding darker part make up a mound that does stick out from the breast.

Picture 5
Only the nipple sticks out beyond the breast.
Again, please choose the picture on this page that looks most like your body now.

A. Picture 1
   No hair.

B. Picture 2
   Very little hair, mostly straight or a bit curly, and light in colour.

C. Picture 3
   Hair is thicker and more curly and is getting darker.

D. Picture 4
   The hair is as dark and curly as an adult but with none on inner thighs.

E. Picture 5
   More hair with some hair on inner thighs.
SECTION H: YOUR FAMILY

Next are some questions about your family. Please think about whoever you consider your family to be.

86. My parents notice when I am doing a good job and let me know about it.
   A. All of the time
   B. Often
   C. Sometimes
   D. Never or almost never

87. How often do your parents tell you they’re proud of you for something you’ve done?
   A. All of the time
   B. Often
   C. Sometimes
   D. Never or almost never

Please answer the following items about your family by choosing BIG YES!, little yes, little no, or BIG NO!

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>yes</th>
<th>no</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>88. Do you feel very close to your mother?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>89. Do you share your thoughts and feelings with your mother?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>90. Do you enjoy spending time with your mother?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>91. Do you feel very close to your father?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>92. Do you share your thoughts and feelings with your father?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>93. Do you enjoy spending time with your father?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>94. If I had a personal problem, I could ask my mum or dad for help.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>95. My parents give me lots of chances to do fun things with them.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>96. My parents ask if I’ve gotten my homework done.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>97. Would your parents know if you did not come home on time?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>98. The rules in my family are clear.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>99. My parents ask me what I think before most family decisions affecting me are made.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YES!</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>------</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>100. When I am not at home, one of my parents knows where I am and who I am with.</td>
<td></td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>101. My parents want me to call if I'm going to be late getting home.</td>
<td></td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>102. My family has clear rules about alcohol and drug use.</td>
<td></td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>103. My parents try to control everything I do.</td>
<td></td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>104. My parents treat me like a baby and try to protect me from everything.</td>
<td></td>
<td>Y</td>
<td>y</td>
<td>n</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Yes</th>
<th>No</th>
<th>I don't have any brothers or sisters</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoked cigarettes?</td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B. Drunk alcohol (like beer, wine or spirits)?</td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>C. Used marijuana (pot, weed, grass)?</td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>D. Taken a weapon to school?</td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>E. Been suspended or expelled from school?</td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Not wrong at all</th>
<th>A little bit wrong</th>
<th>Wrong</th>
<th>Very wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smoke cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>B. Drink beer or wine regularly (at least once or twice a month)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>C. Drink spirits regularly (at least once or twice a month)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>D. Use marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>E. Steal something worth more than $10?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>F. Draw graffiti, or write things or draw pictures on buildings or other property (without the owner's permission)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>G. Pick a fight with someone?</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
107. Has anyone in your family ever had a severe alcohol or drug problem?

   A. Yes
   B. No

<table>
<thead>
<tr>
<th>Q</th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>108. We argue about the same things in my family over and over.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>109. People in my family have serious arguments.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>110. People in my family often insult or yell at each other.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>111. If you drank some alcohol (like beer, wine or spirits) without your parents’ permission, would you be caught by your parents?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>112. If you carried a weapon without your parents’ permission, would you be caught by your parents?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>113. If you skipped school without your parents’ permission, would you be caught by your parents?</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

**SECTION I: YOUR NEIGHBOURHOOD**

The next section asks about the neighbourhood and community where you live.

114. How much do each of the following statements describe your neighbourhood:

<table>
<thead>
<tr>
<th>A. Lots of empty or abandoned buildings</th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Lots of graffiti</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>C. Fights</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>D. Crime and/or drug selling</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>
### 115. Which of the following activities for people your age are available in your community?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Sports teams</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>B. Scouting (Boy Scouts, Girl Scouts, Cubs, Brownies, etc.)</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>C. Youth groups (boys’ and girls’ clubs, church groups, etc.)</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>D. Community service (visiting or helping people, environmental projects, fundraising for charity, service clubs)</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

### 116. There are lots of adults in my neighbourhood that I could talk to about something important.

<table>
<thead>
<tr>
<th>YES:</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

### 117. There are people in my neighbourhood who are proud of me when I do something well.

<table>
<thead>
<tr>
<th>YES:</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

### 118. There are people in my neighbourhood who encourage me to do my best.

<table>
<thead>
<tr>
<th>YES:</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

### 119. My neighbours notice when I am doing a good job and let me know about it.

<table>
<thead>
<tr>
<th>YES:</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

### 120. In my neighbourhood, kids can help decide which activities are provided or how they are run.

<table>
<thead>
<tr>
<th>YES:</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

### 121. In my neighbourhood, adults pay attention to what kids have to say.

<table>
<thead>
<tr>
<th>YES:</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

### 122. If you wanted to get some cigarettes, how easy would it be for you to get some?

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

### 123. If you wanted to get some alcohol (like beer, wine or spirits), how easy would it be for you to get some?

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

### 124. If you wanted to get some marijuana (pot, weed, grass), how easy would it be for you to get some?

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

### 125. If you wanted to get a drug like cocaine, heroin, LSD (acid) or amphetamines (speed), how easy would it be for you to get some?

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

### 126. If you wanted to get a handgun, how easy would it be for you to get one?

<table>
<thead>
<tr>
<th>Very easy</th>
<th>Sort of easy</th>
<th>Sort of hard</th>
<th>Very hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
127. If a kid drank some alcohol (like beer, wine or spirits) in your neighbourhood, would he or she be caught by the police?  
<table>
<thead>
<tr>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

128. If a kid used marijuana in your neighbourhood, would he or she be caught by the police?  
<table>
<thead>
<tr>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

129. If a kid carried a weapon in your neighbourhood, would he or she be caught by the police?  
<table>
<thead>
<tr>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

130. About how many adults (over 21) have you known personally who in the past year have:  
<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>1 adult</th>
<th>2 adults</th>
<th>3 or 4 adults</th>
<th>5 or more adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3-4</td>
<td>5+</td>
</tr>
<tr>
<td>B.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3-4</td>
<td>5+</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3-4</td>
<td>5+</td>
</tr>
<tr>
<td>D.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3-4</td>
<td>5+</td>
</tr>
</tbody>
</table>

A. Gotten drunk or high?
B. Used marijuana (pot, weed, grass) or other illegal drugs?
C. Sold or dealt drugs?
D. Done other things that could get them in trouble with the police like stealing, selling stolen goods, mugging or assaulting others (beating someone up), etc?

131. How wrong would most adults (over 21) in your neighbourhood think it is for kids your age to:  
<table>
<thead>
<tr>
<th></th>
<th>Not wrong at all</th>
<th>A little bit wrong</th>
<th>Wrong</th>
<th>Very wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Smoke cigarettes?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B.</td>
<td>Drink alcohol?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>C.</td>
<td>Use marijuana (pot, weed, grass)?</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
The next few questions ask about your feelings about your neighbourhood. Please answer BIG YES!, little yes, little no, or BIG NO! for each of the following:

<table>
<thead>
<tr>
<th></th>
<th>YES!</th>
<th>yes</th>
<th>no</th>
<th>NO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>132. I feel safe in my neighbourhood.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>133. I’d like to get out of my neighbourhood.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>134. If I had to move, I would miss the neighbourhood I now live in.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>135. I like my neighbourhood.</td>
<td>Y</td>
<td>y</td>
<td>n</td>
<td>N</td>
</tr>
</tbody>
</table>

**SECTION J: SURVEY SUMMARY**

The last two questions ask about the survey as a whole.

136. How important were these questions to you?
   
   A. Very important
   B. Important
   C. Fairly important
   D. Not too important

137. How honest were you in filling out this survey?
   
   A. I was honest all of the time
   B. I was honest most of the time
   C. I was honest some of the time
   D. I was honest once in a while
   E. I was not honest at all
THANK YOU!!

We really appreciate you filling out this survey.

And...we'd love to get your feedback.

Please take a moment to tell us what you thought about the survey by writing your comments in the space provided below:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

When you are finished with this page, please look through your survey booklet and make sure you didn’t skip any questions. Then, raise your hand so we know you are finished and we will collect your survey booklet.
Appendix G: IYDS Survey Instrument – Male Version

In the male version of the survey for the youngest cohort, questions 54 and 55 in section E were worded as follows:

54. Have you begun to grow hair on your face?
55. Have you noticed a deepening of your voice?

Questions 56a and 56b showed pictures of the Tanner Stages of pubertal development for males.

In the male version of the survey for the middle and oldest cohorts, questions 82 and 83 in Section G were worded as follows:

82. Have you begun to grow hair on your face?
83. Have you noticed a deepening of your voice?

Questions 85a and 85b showed pictures of the Tanner Stages of pubertal development for males.
Appendix H: IYDS – Catholic Schools Survey

As per ethics approval, no questions regarding sex were permitted in the surveys administered to Catholic Schools. The following questions were omitted from Section X of the middle and oldest cohorts survey administered in Catholic Schools. No changes were made to the youngest cohort survey as there were no questions relating to sex.

Section F

77E. Have sex with someone which you later regretted?

Section G

84. Have you ever had sex?