Exploring Risk Factors of Substance Use Behaviours in a School Sample of Young Adolescents from Ontario

by

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Abstract:

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Studies show that a substantial number of North American adolescents are engaging in drug and alcohol experimentation prior to the completion of high school. Substance use (SU) initiated during early adolescence, can lead to long-term effects on adolescents. Using cross-sectional data, the objectives of the study were two-fold: 1) determine the characteristics that differentiate substance using adolescents from non-substance using adolescents and 2) identify factors associated with early adolescent SU, while controlling for the relative effects of multiple covariates. Data on a community sample of 787 grade 7 and 8 students from Ontario, Canada was collected. Results indicate, when controlling for the effects of multiple variables associated with SU, grade (OR= 0.63), school closeness (OR=0.79), peer SU (OR=0.44), externalizing disorder symptoms (OR=1.41), depression symptoms by sex, and whether an individual’s parent(s) were born in Canada by region were significantly associated with early adolescent SU.
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# Table of Contents

Abstract

Acknowledgments

Table of Contents

List of Tables

List of Figures

Introduction: Exploring Risk Factors of Substance Use Behaviours in a School Sample of Young Adolescents from Ontario

Chapter 1: Literature Review

1.1 Age and Substance Use

1.2 Socio-Economic Status and Substance Use

1.3 Immigrant Status and Substance Use

1.4 Parental Monitoring and/or Attachment and Substance Use

1.5 Peer Substance Use

1.6 Academic Achievement, School Affiliation, and Substance Use

1.7 Delinquent Behaviours and Substance Use: Crime and Violence

1.8 Comorbid Mental Health and Substance Use

Chapter 2: Research Aims and Hypotheses

2.1 Hypotheses

Chapter 3: Methodology

3.1 Participants

3.2 Sampling Design

3.3 Data Collection Procedures
3.4 Measures ............................................................................................................. 34
3.5 Data Analysis ....................................................................................................... 39

Chapter 4: Results ..................................................................................................... 43
4.1 Participants .......................................................................................................... 43
4.2 Univariate Analyses ............................................................................................ 43
4.3 Hierarchical Multivariable Logistic Regression .................................................. 50

Chapter 5: Discussion .............................................................................................. 56
5.1 Determinants of Early Adolescent Substance Use ............................................. 56
5.2 Multivariable Model: Substance Use .................................................................. 60
5.3 Externalizing and Internalizing Symptomatology and Substance Use .............. 62
5.4 Limitations .......................................................................................................... 64
5.5 Future Research .................................................................................................. 66
5.6 Conclusions and Implications ............................................................................ 66

References .................................................................................................................. 68

Appendix ...................................................................................................................... 86
A) Ontario Dug Use and Health Survey- Longitudinal Questionnaire .................. 87
List of Tables

Table 1: Breakdown of embedded measures by variables ......................................................... 37
Table 2: Pre-adjusted and adjusted sample size by region ......................................................... 40
Table 3: Frequency of use by substance .................................................................................... 43
Table 4: Descriptive statistics: variables by dependent variable ................................................ 45
Table 5: Correlation matrix: Pearson correlation coefficients ...................................................... 46
Table 6: Univariate, pre-adjusted associations between variables and dependent variable .... 47
Table 7: Univariate pre-adjusted associations between variables and dependent variable, by region ........................................................................................................................................... 48
Table 8: Univariate pre-adjusted associations between variables and dependent variable, by sex ................................................................................................................................................. 49
Table 9: Purposeful selection, order of covariate removal from multivariable model ............ 51
Table 10: Final multivariable logistic regression: Full parameter estimates ......................... 52
Table 11: Final multivariable logistic regression: Significant covariate estimates ............... 55
List of Figures

Figure 1: Substance use framework.................................................................29
Figure 2: Sampling design .............................................................................33
Figure 3: Initial multivariable substance use model ......................................50
Figure 4: Final multivariable substance use model........................................53
Figure 5: Sex by depression symptomatology interaction............................54
Introduction:

Exploring Risk Factors of Substance Use Behaviours in a School Sample of Young Adolescents from Ontario

Recent studies have shown an alarming increase in the experimentation and utilization of alcohol and illegal substances among young adolescents (see Anderson & Brown, 2011). Between the ages of 10 and 16, adolescents have a heightened susceptibility and vulnerability to risks associated with substance use (SU)\(^1\) initiation (Andersen & Teicher, 2009; Crews, He, & Hodge, 2007; Hammond, Ahmed, Sae Yang, Brukhalter, & Leatherdale, 2011; Segal, 1991). Experimentation with substances, and/or behaviours associated with moderate to frequent SU, during this high-risk time, can lead to long-term effects such as the development of chronic SU and subsequent problem behaviours related to aggression (Barnes & Farrell, 1992; White, Tice, Loeber, & Southamer-Loeber, 2002), poor academic achievement (Kostelecky, 2005), social withdrawal (Khantzian, 1997), and delinquency (Anthony & Petronis, 1995; Brook, Whiteman, Finch, & Cohen, 1996; Crews et al., 2007; Glantz 1992; Kuhn et al., 2010; Hammond et al., 2011).

However, the prevalence and frequency of SU in adolescents changes over time (Anthony & Petronis, 1995; Segal, 1991). Initially, early adolescence is marked by the onset of substances and transient SU (Paglia-Boak, Adlaf, & Mann 2011; Leatherdale & Burkhalter, 2012; Hammond et al., 2011). During early adolescence the use of alcohol is

\(^1\)Throughout this manuscript the term adolescent substance use (SU) encompasses youth that consume alcohol or engage in illicit drug use under the age of 17.
common and considered to be the experimental substance of choice prior to the initiation of illicit substances (Sells & Blum, 1996).

Secondly, the transition from experimental and recreational SU to durable and frequent SU typically occurs three years after the initiation of SU (Wittchen et al., 2008). The significant increase in illegal SU generally occurs during the transition period of adolescence to young adulthood, approximately between 16 to 18 years of age (e.g., high school aged students) (Leatherdale & Burkhalter, 2012). A recent Canadian study of 45,425 students from grade 7 to grade 12 reported on the frequency of SU by grade (Leatherdale & Burkhalter, 2012). Although SU was reported in younger grades, the prevalence of SU rose considerably from grade 7 to grade 12 (Leatherdale & Burkhalter, 2011). The study reported the current rate of alcohol use increased from 3.4% to 50.8% between the seventh and twelfth grade; marijuana use increased from 3.3% to 29.1% while other illicit drug use increased from 1.7% to 13.3%.

Lastly, after the initial increase of SU during adolescence, there is a notable decline in the rate of SU among individuals 25 years of age and older (Health Canada, 2012; Poelen, Scholte, Engels, Boomsma, & Willemsen, 2005). According to the Canadian Alcohol and Drug Use Monitoring Survey (2011), the incidence of SU among individuals aged 15 to 24 years was considerably higher than among individuals 25 years and older (Health Canada, 2012).

Use of substances among younger adolescents is concerning because compared to individuals with a later period of SU initiation, adolescents who have been using substances prior to their mid-teen years have an increased risk of criminal behaviours (Brook et al., 1996) and the development and expression of psychiatric symptomatology.
Studies suggest a causal association between alcohol use in adolescence and “impulsive” crimes such as assault, property damage, vandalism and arson, which increases the likelihood of legal involvement (Brook, Brook, Rubenstone, Zhang, & Saar, 2011; Slade et al., 2008; White et al., 2002). Among young substance-using adolescents, approximately 60% will present with comorbid psychiatric symptoms (see Armstrong & Costello, 2002).

Furthermore, SU initiated during early adolescence may result in increased SU severity and chronic and dependent SU (Kandel & Faust, 1975). A German study of 3,021 adolescents examined the rates of SU initiation before the age of 14 years and found that 38.5% used alcohol while 1.6% used cannabis and 3.5% used other illicit drugs (Wittchen et al., 2008). Of the adolescents with SU onset before the age of 14 years, 10% of the sample went on to become chronic users of alcohol after the first year of use. The percentage was lower for those using illicit drugs, as 5% transitioned to regular and chronic use during the initial year of use.

The causes and contributions of adolescent SU are complex and involve individual, family, and mental health variables. Since the prevalence and frequency of SU increases with age the factors associated with SU among younger adolescents may be different than the factors associated with SU among older adolescents. Given the high risk of psychological and behavioural problems associated with an early adolescent SU between the ages of 11 and 15, further research to develop a comprehensive understanding of the risk factors of early adolescent SU may identify opportunities for SU prevention and early intervention efforts. Delaying the age of SU initiation may lead to lower rates of dependency and problematic SU in emerging adulthood.
Factors associated with SU initiation and SU can be grouped into the following domains: **demographic factors** such as age (e.g., Anthony & Petronis, 1995), sex (e.g., Whaley, Hayes-Smith, & Hayes-Smith, 2013), socio-economic status (SES) (e.g., Humensky, 2010), and immigrant status (e.g., Bui, 2013); **environmental factors** such as parental monitoring (e.g., Dishion & McMahon, 1998), school affiliation (e.g., Bond et al., 2007), school achievement (Bryant, Schulenberg, O’Malley, Bachman, & Johnston, 2003), family closeness (e.g., Kumpfer & Alvarado, 2003), and peer SU (e.g., Morgan & Grube, 1991); and **mental health factors**, such as externalizing and internalizing disorders (e.g., King, Iacono, & McGue, 2004). To provide context for my thesis, I will review the available literature with a focus on variables within each of these domains. Since many of the variables are correlated, the current study proposes to identify the salient variables associated SU among adolescents aged 11 to 15 years, using a multivariable model.
Chapter 1:  

Literature Review

This section identifies and describes factors affecting SU in young adolescents that will be examined in the current study, including age, SES, immigrant status, parental monitoring and attachment, peer SU, academic achievement, school closeness, delinquency, and comorbid mental health issues.

1.1 Age and Substance Use

Studies show that a substantial number of North American adolescents are engaging in drug and alcohol experimentation prior to the completion of high school (Anderson & Brown, 2011; Hammond et al., 2011; Sells & Blum, 1996), with the average age of alcohol initiation between 10 and 13 (see Swadi, 1992) and illicit SU between 13 and 16 (Segal, 1991; Swadi, 1988). An American study of 1,171 urban seventh and eighth grade students reported comparable SU, with 31.1% taking at least one drink of alcohol in their lifetime; and 21.5% reported drinking in the 30 days prior to completing the survey (Anderson & Brown, 2011). However the study reported only on alcohol use, limiting the generalizability of the results to alcohol use. Data from Canadian studies are consistent with international data on adolescent SU, which illustrates frequent use of substances during early adolescence (Paglia-Boak et al., 2011; Leatherdale & Burkhalter, 2012; Hammond et al., 2011). According to the Ontario Student Drug Use and Health Survey (OSDUHS), a province-wide SU survey of students in grades 7-12, 54.9% have used alcohol while 22.3% reported binge drinking; 37.4%
reported use of drugs, including illicit and non-medical prescription drugs, and 22% used cannabis (Paglia-Boak et al., 2011).

Findings from cohort studies investigating the relationship between age and SU are inconclusive or contradictory depending on factors differing between studies, such as the location of the study. A seven-year study of Dutch youth, aged 12 to 15 years, found a time trend and cohort effect of the prevalence of alcohol use, which increased by 20% between its inception in 1993 and its conclusion in 2000 (Poelen et al., 2005). This study suggests a significant increase in alcohol use over time in early adolescence, with more than 80% of the sample engaging in SU by the age of 15 in the year 2000. The increase in SU may be due to the rise in popularity of “mixed” or sweetened alcohol beverages that cater to young adolescents. However, for some adolescents the initial engagement in alcohol use may be characterized as experimental or exploratory use. In contrast, the Canadian OSDUHS report, reported a decreasing time trend in the use of alcohol among grade 7-12 students, from 66% in 1999 to 54.9% in 2011 (Paglia-Boak et al., 2011). Although the OSDUHS reported a decreasing time trend in the use of alcohol, the sample included high school aged adolescents and was not specific to younger adolescents in the seventh and eighth grade.

Another Canadian study using data from the Youth Smoking Survey examined the trends of illicit SU among young adolescents aged 13-15 and found consistent SU over time. Alcohol use increased marginally between 2002 and 2006 (from 54.5% to 59.1%); use of cannabis remained consistent (18.2% and 17% between 2002 and 2008) while the prevalence of “other substances,” including hallucinogens, prescription drugs, steroids, glue, heroin, MDMA, cocaine, and amphetamines, was 11.6% in 2002 and
12.9% in 2008 (Hammond et al., 2011). Although it is known that an early age of SU initiation is associated with poor outcomes, there are few studies that have investigated the factors associated with SU other than alcohol in young adolescents.

1.2 Socio-economic Status and Substance Use

To date, research describing the effect of SES on adolescent SU has been inconsistent. Some studies have reported that adolescents with higher levels of SES have an increased risk of SU initiation (Humensky, 2010; Sutherland, 2012), whereas other studies have reported adolescents from lower SES families have an increased risk of SU initiation and the use of substances (Hamilton, Noh, & Adlaf, 2009a). Adolescents from families with higher SES levels are thought to have increased access to substances as a result of affordability (Humensky, 2010; Sutherland, 2012). One rationale as to why lower SES is a risk factor for SU is that lower SES is associated with adversity, which increases exposure and risk for early adolescent SU. For example, adolescents from families with low SES may have parents who work longer hours or, in some single-parent homes, work two jobs, affecting the parent-child relationship, and the level of parental monitoring (Barrera et al., 2001) which may increase the likelihood of engaging in early adolescent SU.

When examining the relationship between adolescent SU and SES, parental education has been often used as an indicator of SES (Hamilton et al., 2009a; Humensky, 2010; Sutherland, 2012; Wills, McNamara, & Vaccaro, 1995). Parental education has been shown to have significant effect on adolescent SU (Sutherland, 2012). In a longitudinal study examining the effect of parent education on SU among adolescents from age 11/12 to age 14/15, adolescents with parents who reported attaining higher
levels of education were approximately 1.8 times more likely to report the initiation of marijuana use than participants with parents with no educational qualifications (Sutherland, 2012). Since this study did not control for any additional SU covariates such as peer, family and clinical and/or mental health variables when examining the effect of parental education on marijuana initiation it is unknown whether the influence of parent education on SU would decrease when examined with other covariates.

Similarly, an American study of 9,872 students in grades 7 to 12 examined whether adolescents with parents with a higher level of education were more likely to engage in SU between year one and year three of the study (Humensky, 2010). A multivariable model was used to determine the strength of SES, measured by parental education, while controlling for additional SU risk factors including demographics, mental health, family, and school variables. The findings showed that individuals whose parents completed a college degree were 1.5 times more likely to engage in binge drinking than individuals with a high school-educated parent. Similarly, the likelihood of marijuana use among adolescents with college-educated parents was approximately 1.2 times greater than individuals with a high school-educated parent. Cocaine use was found to be about 1.6 times greater in adolescents with college-educated parents than individuals with a high school-educated parent. Since the authors did not separate the results by grade of the participants, the findings cannot be specified to use of substances among seventh and eighth grade students.

It is important to note that SES is seldom examined on its own. It is often discussed in conjunction with a variety of variables across different contexts, including demographic, environmental, and clinical covariates. Socio-economic status is highly
correlated with many factors, such as quality of living environment, education, family dynamics, exposure to delinquent peer groups and experience of negative life events (see Chen, Matthews, & Boyce, 2002; Wills et al., 1995). Previous research suggests that when examining SES on its own it may appear to influence early adolescent SU, but when additional covariates are included in the analyses the predictive influence of SES reduces significantly as it is highly correlated with other variables and its’ effect is mediated by other risk and protective factors (Humensky, 2010; Wills et al., 1995). For example, a study of 1,775 eighth grade students reported that of the 26 adolescent characteristics and SU risk factors examined such as peer SU, parental support, and academic competence, SES was significantly correlated with 16 of them at the $\alpha=0.01$ significance level (Wills et al., 1995).

When examined individually, parent education is inversely related to adolescent SU. However, when examined in a multivariable model, no direct effect between parent education and SU is found, which suggests the relationship is mediated by several other variables related to adolescent SU. The effect of parent education is considerably reduced when the risk factors of parental SU, negative life events, peer SU are included in the analysis; likewise, when the protective factors of positive parental support and behavioural and academic competence are included in the analyses (Wills et al., 1995).

1.3 Immigrant status and Substance Use

Data investigating the effect immigrant status and SU is inconclusive. According to the ‘immigrant paradox’ immigrant families report lower rates of alcohol or illicit SU compared to native-born individuals (Bui, 2013; Cosmo et al., 2013). However, it has been reported the effect is mediated by additional factors such as length of time spent in
country, level of acculturation, and sex differences (Almeida, Johnson, Matsumoto, & Godette, 2012; Blake, Ledsky, Goodenow, & O’Donnell, 2001). An American study comparing first generation adolescents compared to second and third generation adolescents, found that first generation White, Hispanic and Asian adolescents were less likely to report SU compared to second and third generation adolescents (Bui, 2013). However when immigrant status was examined in a multivariable model, controlling for acculturation, peer SU, family closeness and academic achievement, the effect of immigrant status on SU was no longer significant.

Among an American sample of eighth and tenth grade students, marijuana and alcohol use were higher among native born youth compared to foreign born adolescents or adolescents with foreign born parents (Blake et al., 2001). However, recent immigrants, living in the United States six years or less were more likely to be at risk for future SU initiation, reporting greater peer pressure, lower levels of self assurance to refuse substances, and less parental disapproval of engaging in SU. Results of the study (Blake et al., 2001) suggest that although recent immigrants may appear to be at a reduced likelihood of engaging in SU there is a greater presence of risk factors indicative of future SU initiation.

Currently there is no consensus on the relationship between immigrant status and the risk of SU among young (11-15 year olds) adolescents. The effect of immigrant status appears to be mediated by a variety of other variables (e.g., acculturation, time spent in country, and cultural differences), which may not be equally distributed among the different immigrant groups, or the different regions in which they reside.

1.4 Parental Monitoring and/or Attachment and Substance Use
Studies have found that parental monitoring is linked to the reduced risk of SU initiation and overall instances of alcohol and illicit SU (Barnes & Farrell, 1992; Chilcoat & Anthony, 1996; Kim, Zane, & Hong, 2002; Kumpfer & Alvarado, 2003; Svensson, 2000). Parental monitoring can be defined as parental awareness of their child’s peer groups, whereabouts, and activities, which can include structuring of activities and facilitation of parent-child communication that encourages adolescent disclosure (see Patterson & Stouthamer-Loeber, 1984; Dishion & McMahon, 1998; Stattin & Kerr, 2000). In comparison to other parental correlates, such as perceived parental control and parent-enforced rules, studies have suggested that parental monitoring is not only one of the strongest but also one of the most consistent predictors of adolescent SU (see Tornay et al., 2013). Specifically, a higher level of parental monitoring by the age 13 significantly decreases the likelihood of early adolescent SU initiation (Van Ryzin, Fosco & Dishion, 2012). However, the protective effect of parental monitoring on decreasing the likelihood of SU initiation significantly diminishes during an adolescent’s transition from grade school to high school (Van Ryzin et al., 2012).

A community-based four-year longitudinal study of 926 adolescents aged 8 to 14 years examined the impact of parental monitoring on early adolescent SU (Chilcoat & Anthony, 1996). Parental monitoring was divided into four quartiles ranging from lowest to the highest level of monitoring. Adolescents who reported parental monitoring within the lowest quartile had an earlier age of SU initiation compared to adolescents that reported parental monitoring within a higher quartile. Significant differences between lower and higher levels of parental monitoring were observed before the age of 11, with no significant differences found after the age of 11. The Chilcoat & Anthony (1996)
study did not examine the effect of parental monitoring on early adolescent SU while controlling for other SU factors such as peer SU, SES, mental health issues, academic achievement and family closeness. Not controlling for the effects of other SU factors may inflate the actual predictive influence parental monitoring has on SU; consequently the true effect of parental monitoring awaits further study.

In addition to parental monitoring, the quality of the parent-child relationship has also been shown to affect adolescent peer group choice, which is a well-known risk factor of adolescent SU (Bahr, Hoffmann, & Yang, 2005; Barnes & Farrell, 1992). The quality of the parent-child relationship is defined by parent-child attachment, closeness, the overall perceived positivity of the relationship and parental involvement. The influence of an adolescent’s relationship to his or her parents and family on early adolescent SU is two-fold. The literature has highlighted both the protective role, positive parental relationships has on reducing the risk of engaging in SU (Kostelecky, 2005), as well as the negative effect poor parental relationships, such as detachment, and low parental involvement has on heightening the risk of engaging in SU (Brook, Lukoff, & Whiteman, 1980; Wills & Cleary, 1996).

The effect of the parent-child relationship and parental monitoring appears to also mediate adolescents’ peer group associations (Van Ryzin et al., 2012). Lack of parental supervision and poor parental relationships increase the likelihood of adolescents’ association with substance-using peers, which is a known risk factor of SU in young adolescents (Urberg, Luo, Pilgrim, & Degirmencioglu, 2003). Whereas, parental monitoring and a positive parent-child relationship decreases the likelihood of adolescents’ association with delinquent peer groups, subsequently decreasing the
likelihood of engaging in SU (Dishion, Nelson, & Kavanagh, 2003; Van Ryzin et al., 2012).

Various studies examining the effect of parental monitoring on adolescent SU (Barrera et al., 2001; Kumpfer & Alvarado, 2003; Svensson, 2000; Van Ryzin et al., 2012) have not examined additional factors such as environmental and clinical factors which have been reported to be associated with SU beyond family and peer correlates associated with adolescent SU. It is unknown whether environmental and clinical factors, such as school closeness and externalizing and internalizing symptomatology, affect the degree to which parent(s) are able to monitor behaviours and peer choices of their children and should be further investigated. Research examining the influence of family factors on use of substances is particularly important as family management intervention and education for parents and the overall improvement of the parent-child relationship has been shown to effectively reduce the risk of adolescent SU (Connell, Dishion, Yasui, & Kavanagh, 2007; Dishion et al., 2003; Spoth, Redmond, & Shin, 2001).

1.5 Peer Substance Use

Exposure to, and affiliation with delinquent social networks increases the likelihood of adolescents’ engaging in high-risk behaviours (Eitle, 2005; Ferguson & Meehan, 2011; Kim et al., 2002; Yang, Davey-Rothwell, & Latkin 2013). Association with substance-using peers is considered to be one of the most persistent determinants of adolescent SU (Ferguson & Meehan, 2011; Wills et al., 1995). The effect of peer SU has a greater impact beyond the initiation of SU; it spans an adolescent’s development from SU initiation to increased and chronic use of substances in emerging adulthood (Tornay et al., 2013). Continued exposure to peer SU not only increases the likelihood of SU
initiation among non substance-using adolescents, but also increases the frequency of SU over time and fosters the continued use among substance-using adolescents compared to adolescents with non-substance-using peers (Fergusson & Meehan, 2011; Morgan & Grube, 1991; Simons-Morton & Chen, 2006).

Substance-using peers commonly introduce substances and promote the ongoing use of substances to their non-substance-using peers (Bahr et al., 2005; Kelly et al., 2012). Adolescents are less likely to initiate or engage in SU on their own, especially if none of their peers have or are currently engaging in SU (Bahr et al., 2005). More importantly, association and socialization with substance-using peers is the strongest predictor of SU initiation among non-using adolescents after controlling for other SU correlates (Eitle, 2005; Simons-Morton & Chen, 2006). When examining the combined effect of peer SU, parental attachment and monitoring on SU, the overall influence of parental attachment and monitoring on SU considerably diminishes in comparison to the stronger influence of peer SU (Bahr et al., 2005).

Bahr and colleagues (2005) examined the influence of peer SU and parental correlates on the likelihood of SU using a multivariable analysis. Participants were asked, of their four best friends, how many used the substance in question. The findings illustrate that alcohol use increased by 77% with every one-friend increase in peer alcohol use; and binge drinking increased by 90% with every one-friend increase in peer binge drinking. Additionally, the study reported a 135% increase in marijuana use with every one-friend increase in peer marijuana use while illicit SU increased by 61% with every one-friend increase in peer illicit SU. For all substances reported, the effect of the parental correlates diminished when controlling for the effect of peer SU. Bahr and
colleagues highlighted the significant influence peer SU has on the initiation and frequency of SU. However, this sample, included adolescents aged 12 to 19 and even though the median age of the sample was 15, the authors did not separate the findings by the age of the participants, therefore the extent to which these findings apply to adolescents younger than 15 is not clear.

Acquisition of friendships among adolescents is not a random process and is usually driven by similarity based on their behaviours, attitudes, personality and physical proximity (Urberg, Tolson, & Degirmencioglu, 1998). There are many correlates that influence an adolescent’s selection of substance-using peers and their susceptibility to peer SU influence (Urberg et al., 2003). A longitudinal study of 757 students in grades 6-12 investigated factors that affect the selection of substance-using peers and found adolescents who were the least connected to conventional values, such as positive parent-child relationships or positive school affiliations, were most likely to acquire deviant peer groups (Urberg et al., 2003).

Many of the studies that have examined the effect of peer SU on adolescent SU have done so while controlling for parental and family-related correlates in a mixed sample of grade and high school aged adolescents. Given the lack of research on early aged adolescents (e.g., 11-15 years) additional information examining the degree to which peer SU influences the use of substances, may be informative and may help in identifying new approaches to early intervention and prevention programs.

1.6 Academic Achievement, School Affiliation, and Substance Use

Low academic achievement, poor school culture and lack of school affiliation (Bisset, Markham, & Aveyard, 2007) have all been associated with a greater likelihood of
engaging in SU among adolescents (Diego, Field, & Sanders, 2003; Kostelecky, 2005). Academic difficulties among adolescents have consistently been found to precede SU initiation and, over time, become predictive of chronic SU (Bryant, et al., 2003). In a two-year longitudinal study examining the association between academic achievement and the initiation of SU in a sample of 571 seventh grade students, Henry, Smith, & Caldwell (2007) reported that among students who demonstrated higher academic achievement, the odds of initiating marijuana use were significantly reduced compared to students who demonstrated lower academic achievement (Henry et al., 2007). Among male students, for every one-unit increase in academic achievement scores above the average, the estimated odds of initiating marijuana use decreased by 30%. Similarly, among females, the estimated odds of marijuana use decreased by 33% for every one-unit increase in academic achievement scores above the average. The study only reported on the effect of academic achievement and marijuana use limiting the generalizability of the predictive influence of academic achievement in relation to other substances.

Adolescents’ perceptions of school and their academic beliefs, irrespective of their academic achievement, have also been found to impact the odds of engaging in SU (Bond et al., 2007). For example, when low importance was given to academic achievement and low levels of school affiliation were reported, the likelihood of engaging in SU increased (Hawkins & Weis, 1985; Bryant & Zimmerman, 2002), whereas positive school interest, academic effort and future academic plans, such as applying for college, decreased the likelihood of engaging in SU among adolescents (Bryant et al., 2003; Roeser, Eccles, & Freedman-Doan, 1999). Positive academic beliefs and school affiliation is thought to serve as a protective factor against SU initiation,
significantly deterring adolescents from engaging in SU as compared to adolescents with negative academic beliefs or poor school affiliation (Bryant et al., 2003; Bryant & Zimmerman, 2002; Englund & Siebenbruner, 2012; Henry, et al., 2007). In a study that assessed the effect of school connectedness and school culture on SU, findings indicated that individuals aged 13 to 14 with low school connectedness were approximately 1.7 times more likely to drink alcohol and approximately 2 times more likely to use marijuana by the age of 16 compared to individuals with higher levels of school connectedness (Bond et al., 2007).

Academic achievement and feelings toward academia and school have been shown to influence early adolescent SU (Bryant et al., 2003; Bryant & Zimmerman, 2002; Englund & Siebenbruner, 2012; Henry, et al., 2007). Since, much of the literature has focused on the effect of academic achievement in samples obtained from students in high school the effect of academic achievement on SU among early aged adolescents remains to be determined. Understanding the effect of academic achievement and school affiliation on early adolescent SU may inform approaches to SU prevention among grade school adolescents.

1.7 Delinquent Behaviours and Substance Use: Crime and Violence

The relationship between adolescent SU and delinquency has been well established (Brook et al., 1996; Ford, 2005; Mulvey, Schubert, & Chassin, 2010). However, a causal link between SU and delinquent behaviours is yet to be determined (Ford 2005; Mulvey et al., 2010; White et al., 2002). When examining the association between SU and delinquency, some studies suggest that SU predicts delinquency among adolescents (Loeber & Farrington, 2000; French et al., 2000). Research supporting this
theory has shown SU affects adolescent judgment and lowers inhibitions, which increases aggression and the chances that youth will pursue other delinquent or criminal activities (Brook et al., 1996; White et al., 2002). Additionally, youth may engage in stealing and criminal behaviors for economic reasons, as a way of acquiring money to sustain their SU (French et al., 2000; White et al., 2002).

An alternative explanation of the association between SU and delinquency is that delinquent behaviours precede the onset of SU; therefore the use of substances do not predict delinquency among youth but are, instead a result of delinquency (Bui, Ellickson, & Bell, 2000; Mason, Hitchings, & Spoth, 2007; Wiesner, Kim, & Capaldi, 2005).

Delinquent characteristics such as childhood aggression, antisocial behaviours, defiance, and negative affect are precursors and have been found to increase an adolescent’s susceptibility to SU (Luthar & Cushing, 1997; Mulvey et al., 2010; Wills, Vaccaro, & McNamara, 1994). A study of 457 grade 7 and 8 students examined the influence of adolescent personality and problem behaviours on SU, using data obtained from personality and SU self-report questionnaires (Wills et al., 1994). A cluster analysis was performed placing each individual in one of the five personality groups: (1) ‘problem teens’, (2) ‘conventional teens’ (3) ‘controlled risk takers’, (4) ‘stressed non-deviants’, and (5) ‘withdrawn youth’. Results showed ‘problem teens’ characterized by poor self-control, increased novelty seeking, risk taking, anger, independence, negative affect, history of negative life events, and tolerance for deviance, had the highest overall rate of SU and significantly more instances of SU compared to the other personality groups. ‘Conventional teens’ characterized by contrasting traits of problem teens, including self-control, decreased novelty seeking, not a risk taker, positive affect, lack of tolerance for
deviance, had the lowest overall rate of SU and significantly less instances of SU compared to the other five personality groups (Wills et al., 1994). The results support the notion that personality types that have characteristics similar to those associated with delinquent behaviours precede SU among seventh and eighth grade students.

Although research suggests that delinquent characteristics are the underlying link between delinquency and SU (Brook et al., 1980; Masse & Tremblay, 1997) many of the previously-mentioned delinquent characteristics and SU are based on a common set of variables and risk factors, such as adversity, low SES, and peer SU, and are directly linked to both adolescent SU and delinquency (Mulvey et al., 2010). Adversity, low SES, negative peer influence, peer SU, lack of parental monitoring and lack of parental involvement are all factors that affect the development of adolescent behaviour and increase the risk of early adolescent SU (Wills et al., 1994; Weinberg, Rahdert, Colliver, & Glantz, 1998). Rather than any one direct explanation of the causal link, all of the common covariates (e.g., personality type, aggression, externalizing behaviours) of delinquent characteristics and adolescent SU illustrate the complex relationships that exist between them and adolescent SU. Given the overlap of common risk factors between adolescent SU and delinquency, a multivariable model controlling for known correlated variables may help clarify the relationships among these variables and early adolescent SU.

1.8 Comorbid Mental Health and Substance Use

Many studies have reported high rates of comorbid mental health symptomatology among adolescents engaged in SU (see Armstrong & Costello, 2002). The association between mental health and SU is complex and the causal relationship
between the two is uncertain (Armstrong & Costello, 2002; Kandel et al., 1997). Some studies suggest that mental health factors precede the use of substances while in some cases the use of substances occurs simultaneously or precedes the onset of mental health symptomatology (see Weinberg et al., 1998). Comorbid mental health problems and multiple adjustment problems during early adolescence were found to be significant risk factors for early adolescent SU (Zeitlin, 1999). To date, much of the literature on adolescent SU and mental health symptomatology has been limited to clinical samples (e.g., Chan, Dennis, & Funk, 2008), with only a few studies using community-based samples (e.g., Colder et al., 2013; Paglia-Boak et al., 2011; Stice, Myers, & Brown, 1998).

Internalizing problems (e.g., depression, anxiety) and externalizing problems (e.g., aggression, conduct issues) are pivotal factors in the development and escalation of SU among adolescents (Chan et al., 2008; Colder et al., 2013; Hawkins, Catalano, & Miller, 1992; King et al., 2004; Stice et al., 1998). Externalizing symptoms have been found to heighten the risk of SU by increasing the likelihood of other SU risk factors, such as affiliation with delinquent peers, lack of school and lack of and/or lower family closeness (Stice et al., 1998). Internalizing symptoms have been found to have both a protective and negative effect on the initiation and escalation of adolescent SU (Colder et al., 2013; Stice et al., 1998).

**Comorbid Mental Health: Externalizing Disorders**

Externalizing disorders, such as Conduct Disorder (CD) and Attention Deficit Hyperactivity Disorder (ADHD), have consistently been associated with adolescent SU (see Armstrong & Costello, 2002; Clark et al., 1997; Colder et al., 2013; Hawkins et al.,
1992; Henry, Feehan, McGee, Stanton Moffitt, & Silva, 1993; Stice et al., 1998; Sung, Erkanli, Angold, & Cotello, 2004; Zeitlin 1999). The literature on externalizing disorders has consistently and unequivocally found that the presence of externalizing symptoms increases the odds of engaging in SU among adolescents (see Armstrong & Costello, 2002).

Conduct Disorder is a strong predictor of SU (Boyle et al., 1992; Cohen, Chen, Crawford, Brook, & Gordon, 2007; Henry et al., 1993) and the younger the age of CD onset, the stronger the prediction of SU initiation (Costello, 2007). In a study examining the effect of the co-occurrence of conduct problems and depressive symptoms in a community sample of 15-year old adolescents, a significant association between conduct problems and SU was reported (Henry et al., 1993). The odds of comorbid poly-substance use behaviours were higher for adolescents with conduct problems compared to adolescents without conduct problems when controlling for co-occurring depression symptoms (Henry et al., 1993). Although the Henry and colleagues study used a community sample of adolescents, the multivariable model was limited by only including the two clinical variables of interest (depression and conduct problems) and not controlling for additional variables related to SU, such as SES, parental monitoring, peer SU, and academic achievement.

Additionally, adolescents already engaged in SU are more likely to develop a Substance Use Disorder (SUD) when CD is present (Chan et al., 2008; Sung et al., 2004). In a sample of 166 adolescents seeking treatment for SU issues, with an average age of 15.9, 95% of the sample showed some form of CD behaviour (Brown, Gleghorn, Schuckit, Myers, & Mott, 1996). When controlling for psychiatric disorders such as
anxiety, depression, and ADHD, adolescents with CD were approximately 2 times more like to develop a SUD compared to adolescents without CD (Sung et al., 2004). The effect of a comorbid CD on SUD development was strongest at age 14 and age 15. Like the Henry et al., study, (1993) the Sung et al., study (2004) did not account for additional SU correlates (e.g., SES, parental monitoring, peer SU) other than mental health clinical variables. Additionally the study only reported on adolescents diagnosed with a SUD and did not include adolescents who engaged in SU but did not meet the criteria for a SUD limiting the generalizability of the results to a clinical sample of adolescents.

Research on the association between ADHD and SU is less clear. Some studies have found the odds of engaging in SU are higher in adolescents with ADHD (Molina & Pelham, 2003). A study by Molina & Pelham (2003) examined the risk of early adolescent SU in a sample of 142 adolescents with ADHD and compared them to 100 adolescents without ADHD. Results indicate that there are significant differences between SU of adolescents with and without ADHD diagnoses. When comparing lifetime use of substances, adolescents with ADHD were approximately 3 times more likely to engage in illicit SU other than marijuana as compared to adolescents without ADHD.

In contrast, other studies have found no direct association, determining the relationship with ADHD to be inconclusive and mediated by other externalizing disorders such as CD (see Armstrong & Costello, 2002; Biederman et al., 1997). A longitudinal study comparing a sample of adolescents with ADHD to adolescents without ADHD found no significant differences in the risk of SU development (Biederman et al., 1997). The effect of ADHD symptomatology on early adolescent SU was mediated by other externalizing disorders such as CD (Biederman et al., 1997).
The findings reported by Biederman and colleagues (1997) and by Molina & Pelham (2003) are contradictory. In addition to the contradictory findings another problem is that the findings are based on a clinical sample. Therefore it is unknown what the relationship between ADHD and early adolescent SU would be in a community sample. Consequently it would be informative to examine the relationship between ADHD and early adolescent SU in a community-based sample.

**Comorbid Mental Health: Internalizing Disorders**

Internalizing disorders and symptoms, such as depression and anxiety have also been consistently linked to SU in adolescents (see Armstrong & Costello, 2002). However, the relationship between anxiety disorders and the use of substances remains unclear. In a review by Armstrong & Costello (2002) approximately 53% of the 15 studies reviewed, did not report significant differences in the rates of SU between adolescents with anxiety symptoms compared to adolescents without anxiety symptoms. However many of the studies reviewed on anxiety and SU, did not control for the effects of relevant variables related to SU (e.g., peer, familial and school correlates), include a community sample, and/ or a sample of only grade school adolescents. Therefore, a comprehensive understanding of the effect of anxiety on early adolescent SU is yet to be determined.

A community-based longitudinal study conducted over the course of two years of 387 adolescents aged 11 to 13 examined the association between social and general anxiety symptoms while controlling for the effect of perceived peer SU and/ or SU approval, and alcohol use in early adolescence (Zhehe et al., 2013). The findings showed that peer SU and SU approval from friends significantly affected the association between
social and general anxiety symptoms and likelihood of alcohol use among females. However, no significant effect was demonstrated for males. Females who reported higher levels of social anxiety and reported low levels of perceived peer approval of SU were less likely to engage in alcohol use, whereas higher levels of social anxiety and high levels of peer approval increased the odds of alcohol use (Zehe et al., 2013). The results of the study provide support of the theory that internalizing symptoms contribute to the risk of early adolescent SU within the social context of peer approval and peer SU among females but not among males. However, the study did not control for other comorbid externalizing disorders, family variables and school variables related to SU, limiting the ability to understand the predictive influence internalizing symptoms has on early adolescent SU in relation to externalizing symptomatology. This is important because, it is known that internalizing and externalizing symptoms are often comorbid and thought to be related to SU (Colder et al., 2013). Examining the relationship between anxiety and SU in a community-sample of young adolescents warrants further investigation.

In contrast to data on anxiety and SU, depression is significantly associated with SU. In a study using a community sample of 1,285 adolescents aged 9 to 18, controlling for age, gender, ethnicity, and family SES, the prevalence of depression symptoms were found to increase from approximately 6% in the youth that abstained from alcohol or illicit SU to 23.8% in adolescents that reported weekly alcohol use, to 24.1% among adolescents that reported illicit SU on three or more occasions in the past year (Kandel et al., 1997). Results of the study imply that even infrequent SU was an indicator of depressive symptomatology. Although the study included community adolescents, it also included older youth aged 16 to 18 years of age, limiting the ability to specify the results
to early adolescence. Additionally, while the study controlled for a number of
demographic variables, it did not include other prominent SU risk factors (e.g., peer SU,
family closeness, school closeness, academic achievement). Consequently, the
independent effect of depressive symptomatology on SU remains to be determined.

Some studies have suggested that individuals with internalizing symptoms use
substances as a means of self-medication to reduce emotional distress (Khantzian, 1997).
Other studies have found that higher levels of internalizing symptoms have a protective
effect against the use of substances (Zehe, Colder, Read, Wieczorek, & Lengua, 2013;
Stice et al., 1998). Individuals with internalizing mental health symptoms are more likely
to withdraw socially and fear the consequences of engaging in illicit activities, reducing
the likelihood of associating with deviant peers and, subsequently, decreasing the odds of
engaging in SU (e.g, Armstrong & Costello, 2002).

Mental health disorders can, therefore, precede, follow or be concurrent with SU.
Although differences in the direction of the causal relationship have been reported
between studies, it is important to continue to investigate the relationship between mental
health issues and SU during early adolescence to help inform the development of
prevention strategies to effectively offset the use of substances.
Chapter 2:  
**Research Aims and Hypotheses**

Across different contexts, specific demographic, environmental and clinical factors contribute to the increased susceptibility and vulnerability of the use of substances among adolescents. A number of studies have identified demographic variables influencing adolescent SU, such as age (e.g., Anthony & Petronis, 1995); sex (e.g., Whaley et al., 2013); SES (e.g., Humensky, 2010); immigrant status (e.g., Bui, 2013); environmental variables influencing adolescent SU, such as parental monitoring (e.g., Dishion & McMahon, 1998), school affiliation (e.g., Bond et al., 2007), school achievement (Bryant et al., 2003), family closeness (e.g., Kumpfer & Alvarado, 2003), and peer SU (e.g., Morgan & Grube, 1991) and clinical variables influencing adolescent SU, such as delinquency (e.g., Slade et al., 2008) and comorbid mental health issues (e.g., King et al., 2004).

Several studies have examined the effects that different demographic, environmental and clinical factors have on early adolescent SU, independent of one another. However, only a limited number of studies have taken a holistic approach in examining the different factors collectively and identifying the effect of the complex interplay between demographic, environmental, and clinical factors, and the impact they have on SU in young adolescents. Among the studies that have taken a multivariable model approach, when investigating risk factors associated with adolescent SU (Ferguson & Meehan, 2011; Humensky, 2010), several limitations have emerged, including:

1. The use of clinical-based samples versus community-based samples, which affects the generalizability of the data and results to the general population.
Typically, individuals in clinical samples are recruited from various institutions or service agencies from which they may be seeking services and/or treatment. Therefore, the generalizability of results obtained from these samples is limited to populations from similar sources. Additionally, levels of psychopathology and SU are more likely to be elevated and severe in clinical samples in comparison to community samples because individuals seeking and receiving services are typically symptomatic, often in distress and in need (Feliciano, Yochim, Steers, Jay, & Segal, 2011).

(2) Much of the previous research has examined the univariate associations between individual risk factors and SU without controlling for effects of other potential risk factors. The use of multivariable models would allow for increased knowledge about the relationship between different SU risk factors and their effect on SU in relation to other risk factors associated with adolescent SU. The studies that have used multivariable models in examining covariates of SU among adolescents have been restricted to examining covariates within a specific domain, such as demographic variables, for example. These studies lack the ability to explore a range of possible risk factors across domains, limiting the potential to control for additional covariates beyond a certain domain, such as only controlling for demographic variables, family-related variables or clinical mental health variables.

(3) The definition of SU across studies has varied. In some studies SU was limited to one specific substance. The description of SU did not capture poly-substance use, just alcohol or marijuana use, for example. This limits the ability
to comment on risk factors associated with a number of substances rather than one in particular.

(4) Lastly, the risks associated with SU vary by age. Many of the studies included a mixed sample of both grade school (12 to 14 years) and high school (15 to 18 years) participants. Results of these studies that have not differentiated between the risks associated with grade and high school students are limited in identifying the SU risk factors specific to early aged adolescents and the effect that these risk factors have on use of substances among this specific age group.

Based on the literature, it is known that many of the demographic, environmental and clinical covariates are correlated. The current study proposes to identify the determinants of early adolescent SU using data obtained from a larger Canadian Institutes of Health Research funded five-year longitudinal study, examining concurrent disorders among a school sample of adolescents from Ontario. The objectives of the current study are two-fold; (1) determine the characteristics that differentiate substance using adolescents from non-substance using adolescents during early adolescence at the univariate level and (2) generate a multivariable model, identifying factors associated with SU, among young adolescents, while controlling for the effects of demographic, environmental, and clinical SU covariates. Figure 1 is a visual representation of the SU framework and variables of interest that I will examine in the present study. The variables have been identified in the literature as important correlates of SU and were available for investigation in the present study.
2.1 Hypotheses

Using the variables outlined in the SU framework (see Figure 1), the current study will examine the role of demographic factors (i.e., sex, grade, and whether parent(s) were born in Canada), environmental factors (i.e., peer SU, family closeness and school closeness), and clinical factors (i.e., crime and/ or violence behaviours and mental health symptoms) as possible risk factors of early adolescent SU. Specifically, the following hypotheses were formulated:

1. Based on previous research, it was hypothesized that each of the demographic, environmental, and clinical and/ or mental health factors (see Figure 1) would be
associated with early adolescent SU at the univariate level, when the variables were examined independent of one another.

2. Many of the identified covariates of adolescent SU are correlated. It was hypothesized that of the variables found to be associated with early adolescent SU univariately, when examined in a multivariable model, a number of these variables would no longer be significantly associated with SU. When controlling for the effects of a number of SU covariates, some of the variables’ predictive influence will diminish. The multivariable model will result in a parsimonious yet comprehensive model with a reduced number of covariates associated with the use of substances during early adolescence.

3. To date, the literature has found a strong association between the presence of externalizing disorder and the use of substances (see Armstrong & Costello, 2002). It was hypothesized that when controlling for demographic, environmental, and clinical covariates in the multivariable model, the general mental health screener of externalizing symptomatology would remain a significant covariate of early adolescent SU in the final model.
3.1 Participants

The study survey was administered to 787 grade 7 and 8 students from Ontario, Canada in 2011. Of the students, 49% were male and 51% were female. The grade distribution of respondents who participated in the survey was proportional (i.e., 50% were seventh and eighth graders, respectively). The ages of the participants ranged between 11 to 15 years ($\bar{X} = 12.72$, SD=0.67).

3.2 Sampling Design

The current study is a two-stage cluster design, stratified by region (Stage one: school selection; and Stage two: classroom selection). Researchers of the study divided Ontario into four separate regions to reflect a range of regional characteristics, such as rural, urban, and suburban areas. The four regions: were Southern Ontario (metropolitan Toronto), Western Ontario, Northern Ontario, and Eastern Ontario. Two school boards within each of the four regions were approached, one public and one Catholic, to participate in this study. In total, eight school boards were contacted and seven agreed to participate, with only one school board refusal in Western Ontario.

Stage One: The Selection of Schools

The sampling frame used for school selection was the 2007-2008 Ontario Ministry of Education data which was the most up to date at the time of the school sample selection. The sampling frame included all publically funded institutions, including Catholic and public schools from the seven pre-selected school boards. Private schools, schools on Native reserves and Canadian Forces Bases and specific
geographically inaccessible schools in the north were excluded from the sample. Schools were randomly selected from each of the seven participating school boards. In the event that a school declined participation, a replacement school was randomly selected from available schools in the same region as the school that refused to participate. In total, 23 schools participated in the study.

**Stage Two: Classroom Selection**

A list of grade 7 and grade 8 homerooms, with classrooms of greater than six students was obtained from each school. At least one grade 7 and one grade 8 class were randomly selected from each of the 23 participating schools. In total, 46 classrooms (22 grade 7 classes, 23 grade 8 classes and one grade 7/8 split class) from the seven school boards participated in the study. Figure 2 provides a display of the sampling design.
Figure 2: Sampling Design: Row 4 reflects all grade 7 and 8 students from the eligible schools within each of the school boards selected. Row 6 reflects all eligible grade 7 and 8 students from the selected schools.
3.3 Data Collection Procedures

Data collection commenced in February 2011 and was completed in April 2011. Each student received a consent form requesting parental permission to participate in the study. Students who did not return a signed consent form were not permitted to participate. Out of a total 1,291 eligible students, the consent rate was 61% with 787 students completing the questionnaire. Under the supervision of trained research staff who administered the survey, participants completed the survey within their respective classrooms. Students received a $20.00 gift certificate as an honorarium for completing the questionnaire. The present study obtained ethics approval from the Centre for Addiction and Mental Health’s Research Ethics Board and each participating school board.

3.4 Measures

The OSDUHS was developed in 1977 and is a cross-sectional, self-administered, anonymous school survey in Ontario, Canada. The OSDUHS monitors mental health, physical health, and risk behaviours among students’ grades 7 to 12. The survey documents trends in SU and mental health issues and has provided extensive information, including detailed drug use trends by age, region, and gender (Paglia-Boak et al., 2011). **Ontario Student Drug Use and Health Survey- Longitudinal (OSDUHS-L).** The OSDUHS-L (see Appendix A) is an adaptation of the OSDUHS’s original survey and assesses the development of SU and mental health issues over time. A number of validated measures were embedded within the survey to provide broad coverage of SU and mental health related factors among adolescents. Two versions of the questionnaire were created, reversing the final two sections of the survey to ensure if any questions
were missed due to length, incomplete sections would only be an issue for half of the sample.

**Dependent Variable**

A dichotomous variable was created to examine the dependent variable, substance-using versus non-substance using adolescents. Individuals were categorized in one of the two groups based on their response to a series of questions in the OSDUHS-L, examining SU behaviours in the 12 months preceding the study.

*Non-substance using group:* Students indicated no use of alcohol, cannabis, sniffing of solvents, MDMA/Ecstasy, cocaine, over the counter medications for the purposes of ‘getting a high or buzz’, and prescription medications without a prescription. Students classified in the non substance-using group also included individuals who may have used prescription medication or over the counter medications appropriately or those who indicated that they did not know the substance.

*Substance-using group:* Students indicated use of alcohol (more than a sip of alcohol to see what it is like), cannabis, sniffing of solvents, MDMA/Ecstasy, cocaine, over the counter medications to ‘get high’, or any other prescription medications without a prescription.

**Independent Variables**

Sex, current grade, and age were requested, as well as parental education, which was defined as the highest level of education attained by either parent; “high school or less”, “college or university”, or “don’t know”. In addition, students were asked if their parent(s) were born in Canada and their responses were recorded as “yes” or “no”. When neither parent was born in Canada or one parent was born in Canada, the item was scored as “no”. For consistency purposes, these responses were scored as “no” to match how the
variable has previously been reported in survey data of this kind (Bui, 2013; Hamilton, Noh, & Adlaf, 2009b). To assess level of academic achievement, students were asked on average, what marks do they usually get in school and their responses were grouped into three grade ranges; “80% to 100%”, “60% to 79%” and “59% and below”.

Peer SU was based on the student’s responses to questions in relation to SU behaviours of their peers (see Table 1 for reliability statistics and sample items). The peer SU variable was coded as “yes” to reflect students who indicated that their friends engaged in SU behaviours or as “no” to reflect the opposite.

To assess parental monitoring, students were asked how often does at least one of their parents know where they are. To be consistent with the way in which the original OSDUHS study reports their findings, responses were categorized into one of two categories, parent(s) who “always or usually” know where their child is and parent(s) that “sometimes or never” know where their child is.

The school closeness variable was based on a series of questions, taken from the original OSDUHS, assessing students’ perceptions of the degree to which they felt close to their school (see Table 1). Total scores were calculated and ranged from 3 to 12 with a higher score indicating a higher level of school closeness and/or affiliation.
Table 1: Breakdown of embedded measures by variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measure</th>
<th># items</th>
<th>Sample item</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer SU</td>
<td>OSDUHS-L</td>
<td>3</td>
<td>How many of your closest friends drink alcohol?</td>
<td>0.78</td>
</tr>
<tr>
<td>School closeness</td>
<td>OSDUHS-L</td>
<td>5</td>
<td>I feel like I am part of this school.</td>
<td>0.71</td>
</tr>
<tr>
<td>Family Closeness</td>
<td>PSSS-Fa</td>
<td>7</td>
<td>My family is sensitive to my personal needs.</td>
<td>0.90</td>
</tr>
<tr>
<td>Internalizing</td>
<td>GAIN-SS</td>
<td>5</td>
<td>When was the last time you that you had significant problems with thinking about ending your life or committing suicide?</td>
<td>0.96</td>
</tr>
<tr>
<td>Externalizing</td>
<td>GAIN-SS</td>
<td>5</td>
<td>When was the last time that you started physical fights with other people two or more times?</td>
<td>0.96</td>
</tr>
<tr>
<td>Crime/Violence</td>
<td>GAIN-SS</td>
<td>5</td>
<td>When was the last time that you sold, distributed or helped to make illegal drugs?</td>
<td>0.96</td>
</tr>
<tr>
<td>ADHD</td>
<td>NLSCY</td>
<td>4</td>
<td>I can’t sit still, I am restless.</td>
<td>0.74</td>
</tr>
<tr>
<td>Depression</td>
<td>CESD-12</td>
<td>12</td>
<td>During the last 7 days how often have you had crying spells?</td>
<td>0.85</td>
</tr>
<tr>
<td>Anxiety</td>
<td>SCARED-R</td>
<td>10</td>
<td>I worry about other people liking me.</td>
<td>0.74</td>
</tr>
</tbody>
</table>
Embedded Measures within the OSDUHS-L:

**National Longitudinal Survey of Children and Youth (NLSCY).** Questions used to assess ADHD were taken from the NLSCY (Statistics Canada, 2010), which is used as part of a long-term study of Canadian children that follows their development and well-being from birth to early adulthood. Individuals rated how true four statements, assessing the presence of ADHD symptomatology, are for them (Cronbach’s $\alpha=0.74$; see Table 1). A total score was computed for each participant and scores ranged from 0 to 8 with a higher score indicating the presence of ADHD symptoms.

**Perceived Social Support – Family Subscale (PSS-Fa).** Family closeness and/or affiliation was assessed using the PSS-Fa (Procidano & Heller, 1983). The PSS-Fa was developed to measure to the extent to which an individual believes that his or her family fulfills their needs for support, information and feedback (see Table 1). The PSS-Fa has shown both internal consistency of correlations between items used in the questionnaire (Cronbach’s $\alpha=0.90$) and high test-retest reliability over a one month interval ($r=0.83$; Procidano & Heller, 1983). An average total score was computed for each student. Scores ranged from 0, indicating no perceived social support, to 1, indicating maximum perceived social support provided by family.

**The Global Appraisal of Individual Needs – Short Screener (GAIN-SS).** The GAIN-SS (Dennis, Feeny, Stevens, & Bedoya, 2006) was designed to identify individuals who might have a mental health or SU disorder. Subscales included in the GAIN-SS are Internalizing Disorder screener, Externalizing Disorder screener, Substance Disorder screener, and a Crime/Violence screener. The GAIN-SS has shown internal consistency between items (Cronbach’s $\alpha=0.96$) and is a valid measure of the full GAIN ($r=0.84$ to 0.94; see Dennis, Chan & Funk, 2006). The Internalizing Disorder, Externalizing...
Disorder, and Crime/Violence screeners were used in the current study (see Table 1). A total score was computed for each of the screeners. Scores ranged from 0 to 5 with a higher score indicating the presence of internalizing, externalizing and/or crime/violence symptoms.

*Centre for Epidemiological Studies Depression-12 (CES-D-12-NLSCY).* The CES-D-12-NLSCY is a condensed version of the larger CES-D (Radloff, 1977) which is a depression screener validated for use among adolescents (see Table 1; Radloff, 1991). The CES-D-12 has shown internal consistency of correlations between items used in the questionnaire (Cronbach’s $\alpha = 0.85$; Poulin, Hand, & Boudreau, 2005). A total score was computed for each participant and scores ranged from 0 to 36 with a higher score indicating the presence of depression symptoms.

*Screen for Child Anxiety Related Emotional Disorders (SCARED-R).* The SCARED-R (Muris, Merckelbach, Van Brakel, & Mayer, 1999) is a self-report anxiety measure for children aged 7 to 18 and has been validated with other childhood anxiety measures such as the Revised Children's Manifest Anxiety Scale ($r=0.86$; Muris, et al., 1999). For this study, ten items (Cronbach’s $\alpha=0.74$) of the 41-item measure were used (see Table 1). The ten items chosen by the research team reflect the highest correlated items within each of the anxiety subscales measured in the SCARED-R (Muris et al., 1999). A total score was computed for each participant and scores ranged from 0 to 20 with a higher score indicating the presence of anxiety symptoms.

3.5 Data Analysis

**Post Stratification**

The sample of the current study was compared to the enrollment figures from the Ministry of Education and Training data from 2008 to 2009 academic year. Due to
oversampling and under-sampling across the four regions, post stratification weight factors were calculated and applied to each of the regions. Weight factors were based on the number of eligible grade 7 and 8 participants from the selected school boards in each of the regions, out of the combined total of eligible grade 7 and 8 participants from the seven school boards. After adjustment, the current study’s sample composition is reflective of the population’s composition across each of the seven school boards. Table 2 illustrates participation by region of the pre-adjusted and adjusted sample.

Table 2: Pre-adjusted and adjusted sample size by region

<table>
<thead>
<tr>
<th>Regions</th>
<th>Pre-adjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>South</td>
<td>255</td>
<td>32.40</td>
</tr>
<tr>
<td>North</td>
<td>181</td>
<td>23.00</td>
</tr>
<tr>
<td>East</td>
<td>173</td>
<td>21.98</td>
</tr>
<tr>
<td>West</td>
<td>178</td>
<td>22.62</td>
</tr>
<tr>
<td>Total</td>
<td>787</td>
<td>100</td>
</tr>
</tbody>
</table>

Univariate Analyses

Pre-adjusted (unweighted), descriptive statistics were computed on all the variables included in the initial SU framework (See Figure 1) to identify potential data errors and outliers, and to describe the available data. Preliminary analyses (T-tests, and chi-square tests) were carried out to identify variables associated with the dependent variable (substance-using versus non-substance using adolescents). Stratification analyses were completed on A-priori selected variables of interest, stratifying by region and by sex to identify any possible interactions. A broader p-value of 0.20, as a
screening criterion for inclusion in the multivariable model was used to identify all possible variables of importance (Hosmer, Lemeshow, & Sturdivant, 2013). Prior to conducting the multivariable hierarchical logistic regression analysis, bivariate associations between the independent variables were carried out to assess collinearity.

**Hierarchical Multivariable Logistic Regression Analyses**

The current study’s dataset is hierarchical in nature. The hierarchy for this study places individuals as level-1, and schools as level-2 by region, clustering individuals from the same school within their respective schools compared to a group of individuals from a different school. Intraschool correlation assumes that data from individuals from the same school are more similar than data obtained from individuals' from another school, violating the independence of observations assumption underlying standard logistic regressions. Using a hierarchical model to complete the multivariable logistic regression corrects biases in parameter estimates (Tabachnick & Fidell, 2007), as a result of the intraschool correlation. Hierarchical analyses measure the variability between covariates at different levels of the model and how that may affect the dependent variable (Tabachnick & Fidell, 2007). Accounting for the variability at different levels and the clusters from which the data is drawn increases the models accuracy of prediction (Tabachnick & Fidell, 2007).

Independent variables and interaction terms between variables found to be associated with adolescent SU in the pre-adjusted univariate analyses were included in the multivariable hierarchical logistic regression analysis, allowing us to examine the relative effects of multiple covariates in the model. Purposeful selection was used to reduce and minimize the number of covariates in the final model. The iterative process included removing non-significant covariates with the highest p-values one at a time until
the most parsimonious final model was found that provided the best description of the data at the $\alpha=0.05$ level (Hosmer et al., 2013). All analyses were carried out using the statistical software SPSS 20.0 (IBM corp., 2011) and SAS 9.3 GLIMMIX for Windows (SAS Institute Inc., 2011).
Chapter 4:

Results

4.1 Participants

Based on the measure of SU, 262 (33 %, N=786) participants met criteria for inclusion in the *substance-using group* and were compared to the remaining 524 (67 %, N= 786) cases who were in the *non substance-using group*; see Table 3 for the frequency and percentage of use by substance). The dependent variable (Substance- using versus non substance-using adolescents) could not be computed for one the participants as a result of missing data and was therefore removed from the final analyses. All multivariate analyses were conducted list wise to only include participants with complete data.

Table 3: Frequency of use by substance

<table>
<thead>
<tr>
<th>Substance</th>
<th>N=786</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>158</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Glue (sniffing)</td>
<td>58</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Pain Medication</td>
<td>54</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Cough Medication</td>
<td>47</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Prescription Medication</td>
<td>32</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Cannabis</td>
<td>29</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Over the counter Medication</td>
<td>15</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cocaine</td>
<td>12</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>ADHD Medication</td>
<td>3</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Ecstasy</td>
<td>2</td>
<td>0.3</td>
<td></td>
</tr>
</tbody>
</table>

4.2 Univariate Analyses

Descriptive statistics were carried out on all pre-adjusted variables by SU group (i.e., substance using and non-substance using adolescents; see Table 4 for frequencies, proportions, means and standard deviations). Additionally, collinearity was examined for continuous predictor variables and bivariate correlations were demonstrated to be
acceptable (less than 0.90) for inclusion in the multivariate analysis (see Table 5; Tabachnick & Fidell, 2007).

Preliminary analyses were completed on all pre-adjusted variables to assess the association between the independent variables and dependent variable. Associations between majority of the variables and adolescent SU were found at the $\alpha=0.2$ level (see Table 6). Preliminary analyses were also computed on interactions between variables of interest to assess whether there were any sex or region effects present. Chi-square and t-tests were examined on all of the pre-adjusted variables with SU stratified by region (North, South, East, and West) (See Table 7). Additionally, chi-square and t-tests were computed on all of the pre-adjusted variables with SU stratified by sex (male and female) (see Table 8).
Table 4: Descriptive statistics: variables by dependent variable

<table>
<thead>
<tr>
<th>Demographic Variables</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes N=262</td>
<td>No N=524</td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>140 (3)</td>
<td>254 (65)</td>
</tr>
<tr>
<td>Female</td>
<td>122 (31)</td>
<td>268 (69)</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 7</td>
<td>118 (30)</td>
<td>274 (70)</td>
</tr>
<tr>
<td>Grade 8</td>
<td>144 (37)</td>
<td>250 (63)</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>78 (31)</td>
<td>177 (69)</td>
</tr>
<tr>
<td>North</td>
<td>69 (38)</td>
<td>112 (62)</td>
</tr>
<tr>
<td>West</td>
<td>57 (32)</td>
<td>121 (68)</td>
</tr>
<tr>
<td>East</td>
<td>58 (34)</td>
<td>114 (66)</td>
</tr>
<tr>
<td>Parent education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school or less</td>
<td>34 (37)</td>
<td>57 (63)</td>
</tr>
<tr>
<td>College or University</td>
<td>145 (32)</td>
<td>311 (68)</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>67 (34)</td>
<td>133 (66)</td>
</tr>
<tr>
<td>Parent(s) born in Canada</td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>151 (35)</td>
<td>282 (65)</td>
</tr>
<tr>
<td>No</td>
<td>105 (31)</td>
<td>230 (69)</td>
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</table>

<table>
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<th></th>
</tr>
</thead>
<tbody>
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<td></td>
<td>Yes n (%)</td>
<td>No n (%)</td>
</tr>
<tr>
<td>Academic Achievement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;59%</td>
<td>7 (70)</td>
<td>3 (30)</td>
</tr>
<tr>
<td>60%- 79%</td>
<td>133 (38)</td>
<td>222 (62)</td>
</tr>
<tr>
<td>80%- 100%</td>
<td>119 (30)</td>
<td>293 (70)</td>
</tr>
<tr>
<td>Parental monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always- Usually</td>
<td>232 (32)</td>
<td>501 (68)</td>
</tr>
<tr>
<td>Sometimes-Never</td>
<td>30 (65)</td>
<td>16 (35)</td>
</tr>
<tr>
<td>Peer SU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>130 (56)</td>
<td>103 (44)</td>
</tr>
<tr>
<td>No</td>
<td>129 (24)</td>
<td>418 (76)</td>
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</table>

<table>
<thead>
<tr>
<th>Environmental Variables</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Yes X(SD)</td>
<td>No X(SD)</td>
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<tr>
<td>School Closeness</td>
<td>9.67 (1.86)</td>
<td>10.42 (1.55)</td>
</tr>
<tr>
<td>Family Closeness</td>
<td>0.75 (0.31)</td>
<td>0.86 (0.24)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical/ Mental Health Variables</th>
<th>Substance Use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes X(SD)</td>
<td>No X(SD)</td>
</tr>
<tr>
<td>Crime and Violence</td>
<td>0.75 (0.89)</td>
<td>0.35 (0.56)</td>
</tr>
<tr>
<td>Externalizing Disorders symptoms</td>
<td>1.79 (1.50)</td>
<td>0.96 (1.24)</td>
</tr>
<tr>
<td>Internalizing Disorders symptoms</td>
<td>1.94 (1.68)</td>
<td>1.22 (1.42)</td>
</tr>
<tr>
<td>ADHD symptoms</td>
<td>2.93 (2.04)</td>
<td>2.22 (1.88)</td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td>6.00 (3.45)</td>
<td>4.91 (3.13)</td>
</tr>
<tr>
<td>Depression symptoms</td>
<td>9.92 (6.70)</td>
<td>7.04 (5.05)</td>
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</table>
Table 5: Correlation matrix: Pearson correlation coefficients

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<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
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<td>1. School Closeness</td>
<td>--</td>
<td>.29**</td>
<td>-.25**</td>
<td>-.29**</td>
<td>-.33**</td>
<td>-.27**</td>
<td>-.45**</td>
<td>-.29**</td>
</tr>
<tr>
<td>2. Family Closeness</td>
<td>--</td>
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<td>-.33**</td>
<td>-.30**</td>
<td>-.34**</td>
<td>-.49**</td>
<td>-.22**</td>
<td></td>
</tr>
<tr>
<td>3. Crime and Violence score</td>
<td>--</td>
<td>.55**</td>
<td>.32**</td>
<td>.34**</td>
<td>.32**</td>
<td>.21**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Externalizing score</td>
<td>--</td>
<td>.53**</td>
<td>.57**</td>
<td>.54**</td>
<td>.40**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. ADHD score</td>
<td>--</td>
<td>.43**</td>
<td>.48**</td>
<td>.38**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Internalizing score</td>
<td>--</td>
<td>.63**</td>
<td>.540**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Depression score</td>
<td>--</td>
<td>.61**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Anxiety Score</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**p<.01
Table 6: Univariate pre-adjusted associations between variables and dependent variable

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>$x^2$</th>
<th>df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td>12.38</td>
<td>1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Parent Education</td>
<td>6.24</td>
<td>2</td>
<td>0.044</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Variables</th>
<th>$x^2$</th>
<th>df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Achievement</td>
<td>3.83</td>
<td>2</td>
<td>0.147</td>
</tr>
<tr>
<td>Parental Monitoring</td>
<td>17.62</td>
<td>1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Peer SU</td>
<td>39.62</td>
<td>1</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T-Value</th>
<th>df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Closeness</td>
<td>5.03</td>
<td>433.36</td>
</tr>
<tr>
<td>Family Closeness</td>
<td>2.45</td>
<td>781</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical/ Mental Health Variables</th>
<th>T-Value</th>
<th>df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crime and Violence</td>
<td>-6.02</td>
<td>362.74</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Externalizing Disorders symptoms</td>
<td>-7.94</td>
<td>384.34</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Internalizing Disorders symptoms</td>
<td>-5.78</td>
<td>751</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ADHD symptoms</td>
<td>-4.55</td>
<td>764</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td>-3.24</td>
<td>745</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Depression symptoms</td>
<td>-4.34</td>
<td>383.99</td>
<td>&lt;0.001</td>
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</tbody>
</table>
Table 7: Univariate pre-adjusted associations between variables and dependent variable by region

<table>
<thead>
<tr>
<th></th>
<th>SOUTH</th>
<th></th>
<th>NORTH</th>
<th></th>
<th>WEST</th>
<th></th>
<th>EAST</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Substance Use</td>
<td></td>
<td>Substance Use</td>
<td></td>
<td>Substance Use</td>
<td></td>
<td>Substance Use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes N=78 n (%)</td>
<td>No N=177 n (%)</td>
<td>Statistical Significance</td>
<td>Yes N=69 n (%)</td>
<td>No N=122 n (%)</td>
<td>Statistical Significance</td>
<td>Yes N=57 n (%)</td>
<td>No N=121 n (%)</td>
</tr>
<tr>
<td>Grade</td>
<td>t=-2.25</td>
<td>p&lt;0.001</td>
<td>t=0.01</td>
<td>p=0.93</td>
<td>t=-0.88</td>
<td>p=0.01</td>
<td>t=0.27</td>
<td>p=0.001</td>
</tr>
<tr>
<td>7</td>
<td>28 (36)</td>
<td>96 (54)</td>
<td>38 (55)</td>
<td>60 (54)</td>
<td>22 (39)</td>
<td>57 (47)</td>
<td>30 (52)</td>
<td>61 (54)</td>
</tr>
<tr>
<td>8</td>
<td>50 (64)</td>
<td>81 (46)</td>
<td>31 (45)</td>
<td>52 (46)</td>
<td>35 (61)</td>
<td>64 (53)</td>
<td>28 (48)</td>
<td>53 (46)</td>
</tr>
<tr>
<td>Parent education</td>
<td>Highschool/less</td>
<td>x²=4.36</td>
<td>p=0.01</td>
<td>p=0.11</td>
<td>t=0.01</td>
<td>p=0.001</td>
<td>t=-0.64</td>
<td>p=0.001</td>
</tr>
<tr>
<td></td>
<td>College/University</td>
<td>9 (14)</td>
<td>8 (8)</td>
<td>x²=1.64</td>
<td>10 (19)</td>
<td>26 (23)</td>
<td>x²=0.56</td>
<td>5 (310)</td>
</tr>
<tr>
<td></td>
<td>Don’t Know</td>
<td>41 (62)</td>
<td>70 (67)</td>
<td>p=0.44</td>
<td>30 (56)</td>
<td>57 (50)</td>
<td>p=0.76</td>
<td>33 (65)</td>
</tr>
<tr>
<td></td>
<td>Parents Born in Can.</td>
<td>13 (24)</td>
<td>27 (26)</td>
<td>p=0.96</td>
<td>14 (26)</td>
<td>31 (27)</td>
<td>p=0.20</td>
<td>13 (25)</td>
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<td></td>
<td>No</td>
<td>68 (88)</td>
<td>147 (85)</td>
<td>p=0.49</td>
<td>10 (15)</td>
<td>16 (15)</td>
<td>x²=0.002</td>
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<td>26 (15)</td>
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<td>57 (85)</td>
<td>93 (85)</td>
<td>p=0.96</td>
<td>47 (84)</td>
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<tr>
<td>Parental Monitoring</td>
<td>Sometimes/Neve</td>
<td>x²=5.62</td>
<td>p=0.02</td>
<td>p=0.27</td>
<td>43 (75)</td>
<td>111 (95)</td>
<td>p=0.01</td>
<td>53 (91)</td>
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<tr>
<td></td>
<td>Always/Usual</td>
<td>t=-0.64</td>
<td>p=0.04</td>
<td>p=0.02</td>
<td>69 (93)</td>
<td>108 (96)</td>
<td>p=0.01</td>
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<tr>
<td>Peer SU</td>
<td>Yes</td>
<td>57 (73)</td>
<td>155 (88)</td>
<td>x²=8.11</td>
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<td>71 (65)</td>
<td>x²=21.13</td>
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<tr>
<td></td>
<td>No</td>
<td>21 (27)</td>
<td>22 (12)</td>
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<td>54 (78)</td>
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<table>
<thead>
<tr>
<th></th>
<th>(SD)</th>
<th>(SD)</th>
<th>(SD)</th>
<th>(SD)</th>
<th>(SD)</th>
<th>(SD)</th>
<th>Statistical Significance</th>
<th>(SD)</th>
<th>(SD)</th>
<th>(SD)</th>
<th>(SD)</th>
<th>(SD)</th>
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</thead>
<tbody>
<tr>
<td>Family Closeness</td>
<td>0.80</td>
<td>0.82</td>
<td>0.71</td>
<td>0.88</td>
<td>t=3.53</td>
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<td>0.89</td>
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<td>0.774</td>
<td>0.89</td>
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<td>(0.25)</td>
<td>(0.27)</td>
<td>(0.34)</td>
<td>(0.24)</td>
<td>p&lt;0.001</td>
<td>(0.31)</td>
<td>(0.20)</td>
<td>p&lt;0.001</td>
<td>(0.31)</td>
<td>(0.22)</td>
<td>p&lt;0.001</td>
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</tr>
<tr>
<td>(1.64)</td>
<td>(1.31)</td>
<td>(1.81)</td>
<td>(1.78)</td>
<td>p=0.06</td>
<td>(2.10)</td>
<td>(1.64)</td>
<td>p&lt;0.001</td>
<td>(1.93)</td>
<td>(1.34)</td>
<td>p&lt;0.001</td>
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<td>Depression</td>
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<td>6.68</td>
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<td>10.31</td>
<td>7.19</td>
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<td>9.93</td>
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<td>(8.89)</td>
<td>(4.85)</td>
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<td>(6.96)</td>
<td>(5.09)</td>
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<td>(7.13)</td>
<td>(5.61)</td>
<td>p=0.003</td>
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<td>(1.76)</td>
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<td>(1.39)</td>
<td>(1.33)</td>
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<td>(1.60)</td>
<td>(1.25)</td>
<td>p=0.001</td>
<td>(1.46)</td>
<td>(1.23)</td>
<td>p&lt;0.001</td>
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<td></td>
</tr>
<tr>
<td>Externalizing</td>
<td>1.69</td>
<td>0.72</td>
<td>t=-2.56</td>
<td>1.72</td>
<td>1.18</td>
<td>t=-2.53</td>
<td>1.78</td>
<td>0.96</td>
<td>t=-3.37</td>
<td>1.94</td>
<td>0.90</td>
<td>t=-4.79</td>
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<td>(1.16)</td>
<td>(1.39)</td>
<td>(1.33)</td>
<td>p=0.02</td>
<td>(1.60)</td>
<td>(1.25)</td>
<td>p&lt;0.001</td>
<td>(1.46)</td>
<td>(1.23)</td>
<td>p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADHD</td>
<td>2.81</td>
<td>1.87</td>
<td>t=-2.64</td>
<td>3</td>
<td>2.43</td>
<td>t=-1.82</td>
<td>3.33</td>
<td>2.53</td>
<td>t=-2.42</td>
<td>3.02</td>
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<td>t=-3.20</td>
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<td>(2.40)</td>
<td>(1.70)</td>
<td>(2.54)</td>
<td>(2.07)</td>
<td>p=0.07</td>
<td>(2.16)</td>
<td>(1.95)</td>
<td>p&lt;0.02</td>
<td>(2.04)</td>
<td>(1.73)</td>
<td>p&lt;0.003</td>
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</tr>
<tr>
<td>Internalizing</td>
<td>1.78</td>
<td>1.18</td>
<td>t=-1.99</td>
<td>2.06</td>
<td>1.17</td>
<td>t=-3.45</td>
<td>2</td>
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<td>t=-2.58</td>
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<td>(1.60)</td>
<td>(1.49)</td>
<td>(1.80)</td>
<td>(1.32)</td>
<td>p&lt;0.001</td>
<td>(1.74)</td>
<td>(1.46)</td>
<td>p&lt;0.01</td>
<td>(1.67)</td>
<td>(1.48)</td>
<td>p&lt;0.01</td>
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</tr>
<tr>
<td>Anxiety</td>
<td>5.42</td>
<td>4.88</td>
<td>t=-0.88</td>
<td>6.26</td>
<td>4.83</td>
<td>t=-2.80</td>
<td>5.73</td>
<td>5.06</td>
<td>t=-1.25</td>
<td>6.84</td>
<td>4.74</td>
<td>t=-3.61</td>
</tr>
<tr>
<td>(3.06)</td>
<td>(3.08)</td>
<td>(3.35)</td>
<td>(3.19)</td>
<td>p=0.01</td>
<td>(3.19)</td>
<td>(3.21)</td>
<td>p=0.01</td>
<td>(3.99)</td>
<td>(3.27)</td>
<td>p&lt;0.001</td>
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<td></td>
</tr>
<tr>
<td>Crime/Violence</td>
<td>0.68</td>
<td>0.33</td>
<td>t=-2.25</td>
<td>0.81</td>
<td>0.35</td>
<td>t=3.68</td>
<td>0.73</td>
<td>0.38</td>
<td>t=-2.71</td>
<td>0.77</td>
<td>0.34</td>
<td>t=-3.87</td>
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<tr>
<td>(0.87)</td>
<td>(0.63)</td>
<td>(0.94)</td>
<td>(0.55)</td>
<td>p&lt;0.001</td>
<td>(0.88)</td>
<td>0.63</td>
<td>p&lt;0.01</td>
<td>(0.78)</td>
<td>(0.48)</td>
<td>p&lt;0.001</td>
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<td></td>
</tr>
</tbody>
</table>

48
Table 8: Univariate pre-adjusted associations between variables and dependent variable by sex

<table>
<thead>
<tr>
<th></th>
<th>MALE Sub stance Use</th>
<th>FEMALE Substance Use</th>
<th>Statistical Significance</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes N=140 n (%)</td>
<td>No N=254 n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>65 (46)</td>
<td>146 (57)</td>
<td>$x^2=4.43$ p=0.04</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>75 (54)</td>
<td>108 (43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent(s) born in Canada</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>48 (36)</td>
<td>112 (45)</td>
<td>$x^2=3.20$ p=0.03</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>87 (64)</td>
<td>137 (55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental Monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes/Never</td>
<td>15 (11)</td>
<td>10 (4)</td>
<td>$x^2=6.80$ p=0.01</td>
<td></td>
</tr>
<tr>
<td>Always/Usually</td>
<td>125 (89)</td>
<td>241 (96)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer SU</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>76 (55)</td>
<td>200 (79)</td>
<td>$x^2=26.30$ p&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>63 (45)</td>
<td>52 (21)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Closeness</td>
<td>0.81 (0.77)</td>
<td>0.87 (0.22)</td>
<td>t=2.35 p=0.02</td>
<td>0.67 (0.35)</td>
</tr>
<tr>
<td>School Closeness</td>
<td>9.71 (1.90)</td>
<td>10.15 (1.62)</td>
<td>t=2.27 p=0.02</td>
<td>9.61 (1.81)</td>
</tr>
<tr>
<td>Depression</td>
<td>7.93 (5.18)</td>
<td>6.34 (4.37)</td>
<td>t=2.93 p=0.004</td>
<td>12.16 (7.49)</td>
</tr>
<tr>
<td>Externalizing</td>
<td>1.74 (1.48)</td>
<td>0.99 (1.27)</td>
<td>t=5.04 p&lt;0.001</td>
<td>1.84 (1.53)</td>
</tr>
<tr>
<td>ADHD</td>
<td>3 (2.15)</td>
<td>2.40 (1.99)</td>
<td>t=2.73 p=0.01</td>
<td>2.86 (1.92)</td>
</tr>
<tr>
<td>Internalizing</td>
<td>1.53 (1.56)</td>
<td>1.02 (1.31)</td>
<td>t=3.24 p=0.001</td>
<td>2.42 (1.70)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>5.09 (3.01)</td>
<td>4.27 (2.71)</td>
<td>t=2.68 p=0.01</td>
<td>7.08 (3.62)</td>
</tr>
<tr>
<td>Crime/Violence</td>
<td>0.87 (0.87)</td>
<td>0.45 (0.63)</td>
<td>t=5.02 p&lt;0.001</td>
<td>0.60 (0.89)</td>
</tr>
</tbody>
</table>

49
4.3 Hierarchical Multivariable Logistic Regression

The initial model included all univariate and interaction associations with SU at the $\alpha=0.2$ level. In total 40 covariates were analyzed in the model (Figure 3).

$$y_{ij} = \beta_{o} + \beta_{1}\text{region}_i + \beta_{2}\text{grade}_i + \beta_{3}\text{sex}_i + \beta_{4}\text{borncanada}_i + \beta_{5}\text{parenteduc}_i + \beta_{6}\text{monitoring}_i + \beta_{7}\text{school}_i + \beta_{8}\text{marks}_i + \beta_{9}\text{family}_i + \beta_{10}\text{peer}_i + \beta_{11}\text{crime}_i + \beta_{12}\text{internal}_i + \beta_{13}\text{external}_i + \beta_{14}\text{anxiety}_i + \beta_{15}\text{depression}_i + \beta_{16}\text{adhd}_i + \beta_{17}(\text{region} \times \text{sex})_i + \beta_{18}(\text{region} \times \text{monitoring})_i + \beta_{19}(\text{region} \times \text{borncanada})_i + \beta_{20}(\text{region} \times \text{school})_i + \beta_{21}(\text{region} \times \text{family})_i + \beta_{22}(\text{region} \times \text{crime})_i + \beta_{23}(\text{region} \times \text{internal})_i + \beta_{24}(\text{region} \times \text{external})_i + \beta_{25}(\text{region} \times \text{peer})_i + \beta_{26}(\text{region} \times \text{parenteduc})_i + \beta_{27}(\text{region} \times \text{anxiety})_i + \beta_{28}(\text{region} \times \text{depression})_i + \beta_{29}(\text{region} \times \text{adhd})_i + \beta_{30}(\text{sex} \times \text{adhd})_i + \beta_{31}(\text{sex} \times \text{monitoring})_i + \beta_{32}(\text{sex} \times \text{peer})_i + \beta_{33}(\text{sex} \times \text{depression})_i + \beta_{34}(\text{sex} \times \text{family})_i + \beta_{35}(\text{sex} \times \text{grade})_i + \beta_{36}(\text{sex} \times \text{borncanada})_i + \beta_{37}(\text{sex} \times \text{externalizing})_i + \beta_{38}(\text{sex} \times \text{internalizing})_i + \beta_{39}(\text{sex} \times \text{anxiety})_i + \beta_{40}(\text{sex} \times \text{crime})_i + e_{ij}$$

Figure 3: Initial multivariable substance use model

Where the probability of SU for individual $i$, in school $j$, is conditional on the risk factors included in the model. Table 9 provides the order in which non-significant covariates were removed from the model through purposeful selection.

Variables that emerged as significant covariates of adolescent SU remained in the final multivariable model at the $\alpha=0.05$ level (Figure 4). When looking at all the variables together, grade, peer SU, school closeness, externalizing disorder symptoms, and two interaction terms, parent(s) born in Canada by region and depression symptoms by sex were significantly associated with adolescent SU; see Table 10 for parameter estimates for the final model.
Table 9: Purposeful selection, order of covariate removal from multivariable model

<table>
<thead>
<tr>
<th>All Covariates Included In The Final Model</th>
<th>Order of Covariate Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTERACTIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Parental Monitoring by Region (interaction)</td>
<td>Parental Monitoring by Region (interaction)</td>
</tr>
<tr>
<td>Anxiety score by Sex (interaction)</td>
<td>Anxiety score by Sex (interaction)</td>
</tr>
<tr>
<td>Region by Sex (interaction)</td>
<td>Region by Sex (interaction)</td>
</tr>
<tr>
<td>ADHD score by Region (interaction)</td>
<td>ADHD score by Region (interaction)</td>
</tr>
<tr>
<td>Family score by Sex (interaction)</td>
<td>Family score by Sex (interaction)</td>
</tr>
<tr>
<td>School score by Region (interaction)</td>
<td>School score by Region (interaction)</td>
</tr>
<tr>
<td>Crime/Violence Score by Region (interaction)</td>
<td>Crime/Violence Score by Region (interaction)</td>
</tr>
<tr>
<td>Depression score by Region (interaction)</td>
<td>Depression score by Region (interaction)</td>
</tr>
<tr>
<td>Parent Education by Region (interaction)</td>
<td>Parent Education by Region (interaction)</td>
</tr>
<tr>
<td>Crime/Violence score by Sex (interaction)</td>
<td>Crime/Violence score by Sex (interaction)</td>
</tr>
<tr>
<td>Externalizing score by Sex (interaction)</td>
<td>Externalizing score by Sex (interaction)</td>
</tr>
<tr>
<td>Peer SU by Region (interaction)</td>
<td>Peer SU by Region (interaction)</td>
</tr>
<tr>
<td>Externalizing score by Region (interaction)</td>
<td>Peer SU by Sex (interaction)</td>
</tr>
<tr>
<td>ADHD score by Sex (interaction)</td>
<td>ADHD score by Sex (interaction)</td>
</tr>
<tr>
<td>Internalizing score by Sex (interaction)</td>
<td>Internalizing score by Sex (interaction)</td>
</tr>
<tr>
<td>Parental Monitoring by Sex (interaction)</td>
<td>Parental Monitoring by Sex (interaction)</td>
</tr>
<tr>
<td>Family score by Region (interaction)</td>
<td>Family score by Region (interaction)</td>
</tr>
<tr>
<td>Internalizing score by Region (interaction)</td>
<td>Internalizing score by Region (interaction)</td>
</tr>
<tr>
<td>Anxiety score by Region (interaction)</td>
<td>Anxiety score by Region (interaction)</td>
</tr>
<tr>
<td>Parent(s) Born in Canada by Sex (interaction)</td>
<td>Parent(s) Born in Canada by Sex (interaction)</td>
</tr>
<tr>
<td>Depression score by Sex (interaction)</td>
<td>Depression score by Sex (interaction)</td>
</tr>
<tr>
<td>Parent(s) Born in Canada by Region (interaction)</td>
<td>Parent(s) Born in Canada by Region (interaction)</td>
</tr>
<tr>
<td><strong>MAIN EFFECTS</strong></td>
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<tr>
<td>ADHD Score (main effect)</td>
<td>Anxiety score (main effect)</td>
</tr>
<tr>
<td>Parental Monitoring (main effect)</td>
<td>Family score (main effect)</td>
</tr>
<tr>
<td>Academic Achievement (main effect)</td>
<td>Grade by Sex (interaction)</td>
</tr>
<tr>
<td>Anxiety score (main effect)</td>
<td>Crime/Violence score (main effect)</td>
</tr>
<tr>
<td>Family score (main effect)</td>
<td>Parent(s) Born in Canada by Sex (interaction)</td>
</tr>
<tr>
<td>Grade by Sex (interaction)</td>
<td>Internalizing score (main effect)</td>
</tr>
<tr>
<td>Crime/Violence score (main effect)</td>
<td></td>
</tr>
<tr>
<td>Internalizing score (main effect)</td>
<td></td>
</tr>
<tr>
<td>Parental Monitoring (main effect)</td>
<td></td>
</tr>
<tr>
<td>Region (main effect)</td>
<td></td>
</tr>
<tr>
<td>Sex (main effect)</td>
<td></td>
</tr>
<tr>
<td>Externalizing score (main effect)</td>
<td></td>
</tr>
<tr>
<td>Depression score (main effect)</td>
<td></td>
</tr>
<tr>
<td>Peer SU (main effect)</td>
<td></td>
</tr>
<tr>
<td>Grade (main effect)</td>
<td></td>
</tr>
<tr>
<td>School Score (main effect)</td>
<td></td>
</tr>
<tr>
<td>Parent(s) Born in Canada (main effect)</td>
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</tr>
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</table>
Table 10: Final multivariable logistic regression: Full parameter estimates

<table>
<thead>
<tr>
<th>Effect</th>
<th>$\beta$</th>
<th>Standard Error</th>
<th>Df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.06</td>
<td>1.61</td>
<td>19</td>
<td>0.07</td>
</tr>
</tbody>
</table>

**Demographic Predictor Variables**

<table>
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<tr>
<th>Region</th>
<th>$\beta$</th>
<th>Standard Error</th>
<th>Df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>=East</td>
<td>-0.70</td>
<td>1.43</td>
<td>19</td>
<td>0.63</td>
</tr>
<tr>
<td>=North</td>
<td>-0.14</td>
<td>1.87</td>
<td>19</td>
<td>0.94</td>
</tr>
<tr>
<td>=South</td>
<td>-0.08</td>
<td>1.38</td>
<td>19</td>
<td>0.96</td>
</tr>
<tr>
<td>Sex= Female vs. Male</td>
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<td>22</td>
<td>0.01</td>
</tr>
<tr>
<td>Grade= 7 vs. 8</td>
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<td>0.20</td>
<td>21</td>
<td>0.03</td>
</tr>
<tr>
<td>Parent(s) Born in Canada= Yes vs. No</td>
<td>-0.79</td>
<td>1.44</td>
<td>16</td>
<td>0.59</td>
</tr>
<tr>
<td>Region*Parent(s) Born in Canada= Yes vs. No</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>=West</td>
<td>-0.79</td>
<td>1.44</td>
<td>16</td>
<td>0.59</td>
</tr>
<tr>
<td>=East</td>
<td>0.82</td>
<td>0.44</td>
<td>16</td>
<td>0.08</td>
</tr>
<tr>
<td>=North</td>
<td>-0.45</td>
<td>1.36</td>
<td>16</td>
<td>0.74</td>
</tr>
<tr>
<td>=South</td>
<td>-1.26</td>
<td>0.41</td>
<td>16</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Environmental Predictor Variables**

| School Closeness                | -0.24   | 0.07           | 604 | <0.001  |
| Peer SU= No vs. Yes             | -0.82   | 0.25           | 21  | 0.003   |

**Clinical/Mental Health Predictor Variables**

| Depression Symptoms             | -0.07   | 0.04           | 604 | 0.05    |
| Externalizing Disorder Symptoms  | 0.35    | 0.08           | 604 | <0.001  |
| Sex*Depression                   | --      | --             | --  | --      |
| Male*Depression                  | -0.70   | 0.03           | 604 | 0.04    |
| Female*Depression                | 0.02    | 0.03           | 604 | 0.37    |
As indicated in Table 11, substance-using adolescents endorsed higher externalizing disorder symptoms (Odds Ratio=1.41, p<0.001, 95% CI: 1.20, 1.67) compared to non-substance using adolescents. Adolescents were less likely to report SU if they were in the seventh grade (Odds Ratio=0.63, p=0.03, 95% CI: 0.42, 0.94), reported higher levels of school closeness (Odds Ratio=0.77, p<0.001, 95% CI: 0.68, 0.91), and reported no association with substance-using peers (Odds Ratio=0.44, p=0.003, 95% CI: 0.26, 0.73).

To better understand the significant interaction between parent(s) born in Canada by region, odds ratios were computed for each of the regions comparing parent(s) born in Canada versus parent(s) not born in Canada. Adolescents of parents born in Canada and living in the Southern region were less likely to engage in SU (Odds Ratio=0.28, p=0.01, 95% CI: 0.12, 0.67) compared to adolescents of parent(s) not born in Canada living in the Southern region. However, no significant differences were found between adolescents with parent(s) born in Canada versus not born in Canada and adolescent SU from the North (Odds Ratio=0.64, p=0.74, 95% CI: 0.04, 11.37), East (Odds Ratio=2.27, p=0.08, 95% CI: 0.90, 5.76), and in the West (Odds Ratio=0.45, p=0.59, 95% CI: 0.02, 9.48).

The predicted probabilities of SU for different depression scores were plotted by sex. Figure 5 provides a visual representation of the relationship between depression symptomatology and probability of engaging in SU by sex. As can be seen in the graph, males endorsing more depressive symptoms had a lower probability of engaging in SU whereas females endorsing...
more depressive symptoms had a higher probability of engaging in SU. However, the slope was significant for males (Odds Ratio=0.93, p=0.046, 95% CI: 0.87, 0.99) but not for females (Odds Ratio=1.02, p=0.37, 95% CI: 0.97, 1.08). For every one-unit increase in depression scores, males were approximately 7% less likely to engage in early adolescent SU.

Figure 5: Sex by depression symptomatology interaction

When controlling for the effects of multiple variables associated with early adolescent SU, grade, school closeness, peer SU, externalizing disorder symptoms, depression symptoms by sex, and whether an individual’s parent(s) were born in Canada by region emerge as significant covariates. Of the 40 additive and interaction terms included in the initial model, six terms (four additive and two interactions) remained in the final multivariable model.
Table 11: Final multivariable logistic regression: Significant covariate estimates

<table>
<thead>
<tr>
<th>Effect</th>
<th>$\beta$</th>
<th>Standard Error</th>
<th>Df</th>
<th>P-value</th>
<th>Odds Ratio</th>
<th>95% Lower CI</th>
<th>95% Upper CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.06</td>
<td>1.61</td>
<td>19</td>
<td>0.07</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Demographic Predictor Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade= 7 vs. 8</td>
<td>-0.47</td>
<td>0.20</td>
<td>21</td>
<td>0.03</td>
<td>0.63</td>
<td>0.42</td>
<td>0.94</td>
</tr>
<tr>
<td>Region*Parent(s) Born in Canada= Yes vs. No</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>=West</td>
<td>-0.79</td>
<td>1.44</td>
<td>16</td>
<td>0.59</td>
<td>0.45</td>
<td>0.02</td>
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Chapter 5:
Discussion

The objective of the current study was to identify risk factors that differentiate substance-using adolescents from non-substance-using adolescents during early adolescence. This study examined the combined effect of demographic, environmental and clinical factors on SU among early aged adolescents between the ages of 11 and 15 years. Applying the current study’s framework of SU (See Figure 1), a number of covariates were associated with early adolescent SU. In total four covariates: a higher grade, exposure to peer SU, lower levels of perceived school closeness, the presence of externalizing symptomatology, and two interactions: depression symptomatology by sex and whether an individual’s parent(s) were born in Canada by region were significantly associated early adolescent SU.

5.1 Determinants of Early Adolescent Substance Use

The purpose of the current study was to investigate whether the determinants of early adolescent SU differed from the determinants of SU in older adolescents as described in the literature. With the exception of academic achievement, all of the variables investigated in the present study were significantly associated with early adolescent SU ($\alpha=0.05$ level), either as a main effect or as part of an interaction.

Age and the use of substances have consistently been shown to be associated, although data investigating the effect of age on SU specific to grade school adolescents is scarce. The 33% of adolescents in the present study who reported SU, were more likely to be in grade 8 (55%) compared to grade 7 (45%), which is comparable to the increased prevalence of SU among older adolescents found in past studies (Anderson & Brown,
2011; Kosterman, Hawkins, Guo, Catalano & Abbott, 2000; Wittchen et al., 2008). The present study is one of the first studies to provide data on the relationship between age and SU, for substances other than just alcohol, specific to adolescents 15 years of age and younger. Given a significant difference of seventh grade students having lower rates of SU compared to eighth grade students, this study highlights the importance of SU preventative measures being implemented and tailored to adolescents as young as those in the seventh grade.

Results of the current study are consistent with previous research asserting that a lack of parental monitoring notably heightens the risk of SU among adolescents (Barnes & Farrell, 1992; Chilcoat & Anthony, 1996). However, in contrast to some studies reporting that the effect of parental monitoring was only observed in adolescents before the age of 11 (Chilcoat & Anthony, 1996), the current study reported an increase in SU among adolescents with lower levels of parental monitoring up to the age of 15. As previously noted, when parents do not monitor the activities and behaviours of their children, parents are less likely to be mindful of the presence of risk factors related to SU behaviours with their children, such as associating with substance-using peers (Bahr et al., 2005; Brook et al., 1980; Tornay et al., 2013; Van Ryzin et al., 2012). From a preventative standpoint, health professionals concerned with the potential use of substances in adolescents should promote efforts to counsel parents to supervise and monitor the behaviours of their children. Increased supervision and monitoring can help parents become aware of the presence of SU risk factors, which can reduce the risk of SU, especially during early adolescence (Kosterman, Hawkins, Haggerty, Spoth, & Redmond, 2001).
Furthermore, adolescents with lower levels of perceived family closeness were more likely to engage in SU compared to adolescents with higher levels of perceived family closeness. These results conform to previous literature, which consistently report that lower levels of family closeness, increases the risk of SU during early adolescence (Vorst, Engels, Meeus, Dekovic, & Vermulst, 2006; Wills & Cleary, 1996). The current study was able to provide support for the notion that low levels of perceived family closeness at a young age (11-15 years) also heightens the risk of SU. When adolescents lack a positive relationship with their family they are less compliant with parental expectations and less inclined to abide by the rules of their parents, including abstinence from substances (Barnes & Farrell, 1992; Wills & Cleary, 1996). These results are important in understanding the role family closeness and support plays in young adolescents’ choice to engage in SU.

As expected, significant associations between mental health issues and SU were found. Adolescents in the current study who endorsed more clinical symptoms suggestive of ADHD, anxiety, depression, crime/violence, externalizing and internalizing symptoms were more likely to engage in SU compared to adolescents who endorsed fewer mental health symptoms. Interestingly, in contrast to some studies reporting no difference in SU between those with and without ADHD (Biederman et al., 1997), results indicate adolescents who endorsed a greater number of ADHD symptoms were more likely to engage in early adolescent SU compared to adolescents who endorsed fewer ADHD symptoms. Although existing data on the association between ADHD and SU is unclear (see Armstrong & Costello, 2000), results of the current study
suggest identifying adolescents with symptoms of ADHD can aid in recognizing adolescents at risk for early adolescent SU.

Significant findings of the association with SU appear to apply to a variety of symptom groups. The current study is one of the few community-based studies to report similar findings to what has been reported in studies using clinical-based samples (Colder et al., 2013). These findings highlight the significance of emerging mental health symptoms indicative of internalizing and externalizing disorders in early adolescence as a risk factor for early adolescent SU. This may be a result of the simultaneous onset and expression of mental health symptomatology. However, since the study was a cross-sectional one, it is not known if there is a causal relationship between mental health symptomatology and the use of substances (Armstrong & Costello, 2002; Kandel et al., 1997). It is possible the use of substances and mental health symptomatology, such as internalizing and externalizing symptoms, anxiety, depression, ADHD and crime and violence, during early adolescence are independent occurrences as a result of a common risk factor, such as SES, and internal emotional or behavioural dysregulation (Cheetham, Allen, Yucel, & Lubman, 2010).

In contrast to previous literature, academic achievement did not emerge as a significant covariate of early adolescent SU. With only 1% of the adolescents in the current study reporting overall academic achievement in the 59% or below grade range, it is possible that no differences in academic achievement between adolescents with and without SU behaviours were apparent due to the skewed distribution. However, previous research reporting a significant difference between adolescents with high and poor academic achievement and the use of substances has commonly been found in adolescent
samples that include high school-aged youth. It is possible that academic achievement may be a significant covariate of SU specific to older adolescents in high school. In a high school setting the curriculum and grading methods become more demanding, leading to greater dispersion in the range of achievement results (see Tilleczek & Ferguson, 2007). Among a grade school sample of early adolescents it is very likely that the effect of academic achievement is not as pronounced based on the curriculum structure, school culture and a decreased emphasis on high achievement compared to the emphasis that is placed on high achievement in high school (see Tilleczek & Ferguson, 2007).

5.2 Multivariable Model: Substance Use

The second objective of the study was to generate a multivariable model that could determine the likelihood of early adolescent SU using covariates associated with SU at the univariate level. As hypothesized, many of the variables influence on SU diminished when other variables in the model were controlled for. Results of the study found that many of the variables were correlated (See Table 5 for correlation matrix). When controlling for all factors (see Figure 1) associated with early adolescent SU only grade, school closeness, peer SU, externalizing symptoms and the interactive effects of depression by sex and parents born in Canada by region were significantly associated with early adolescent SU.

Within the Southern region of Ontario, adolescents whose parents were born in Canada were less likely to report SU compared to those whose parents were not born in Canada. This was true only in South Ontario and not in any of the other three regions. Some studies report that foreign-born adolescents or children of recent immigrants may
be susceptible to pressure to conform and peer pressure resulting in an increased likelihood of engaging in SU (Blake et al., 2001). However, other studies have reported a protective effect among foreign-born adolescents or those with foreign-born parents resulting in a reduced likelihood of engaging in SU (Gfroerer, Tan, & Tan, 2003). The differences in the effect of immigrant status on SU reported between cultures (Bui, 2013) might be a result of cultural groups having different attitudes toward SU with some groups showing stronger prohibitions than others. Additionally, South Ontario has the largest proportion for immigrant settlement, approximately 37% of the total foreign-born population in Canada, compared to East, West, and North Ontario (Statistics Canada, 2013); this may account for the significant difference emerging only in the South.

In the East region a trend level interaction emerged reporting the opposite of what was found in the South, suggesting adolescents of foreign-born parent(s) were associated with a reduced risk of early adolescent SU. Since studies have reported inconsistent findings on the effect of immigrant status across cultures (e.g., Bui, 2013) it is possible that the effect of parent(s) born in Canada manifests differently in each region, which is reflective of the variation in in cultures that make up each regions immigrant composition.

Additionally, post-stratification, the adjusted sample sizes in the East, West and North regions of Ontario were significantly reduced. Due to the small sample size there may have not been enough power to detect significant differences between adolescents with and without foreign-born parents. Therefore, it is possible the relationship between early adolescent SU and immigrant status could not be fully determined.
When controlling for the effect of additional SU variables such as parental monitoring and family closeness, in the model, Peer SU remains significant. Adolescents who reported no association with substance-using peers were half as likely to report engaging in SU compared to those who reported peer SU. Thus, suggesting that the influence of peer SU accounts for the variance that was originally explained by the univariate effects of other SU factors such as parental monitoring and family closeness. This is consistent with previous data reporting peer SU as one of the strongest covariates of adolescent SU when examined in a multivariable model with other SU factors (Bahr et al., 2005; Tornay et al., 2013). However, research examining the relationship between peer SU and early adolescent SU have done so using mixed samples of both grade and high school students (Bahr et al., 1995). The is one of the few studies to provide evidence that the effect of peer SU on adolescent SU is just as pertinent in a Canadian sample of grade school adolescents.

5.3 Externalizing and Internalizing Symptomatology and Substance Use

It was hypothesized that of the clinical variables significant at the univariate level, externalizing symptomatology would emerge as a significant covariate of early adolescent SU in the final multivariable model. Past studies have reported robust associations between externalizing symptomatology and SU (see Armstrong & Costello, 2002). However, many of the studies reporting on the effect of externalizing symptoms on SU have done so only in clinical samples. Additionally, studies examining the effect of externalizing symptoms on the use of substances, while controlling for the effects of other SU variables, have been limited to including either just mental health covariates or selected demographic or environmental covariates in their models. In contrast, the
current study examined the effect of externalizing symptomatology on early adolescent SU by including a comprehensive set of covariates (e.g., family, peer, school, and mental health correlates) in a community sample of young adolescents. As hypothesized, externalizing symptoms remained significantly associated with early adolescent SU. Importantly, this finding was significant even when controlling for additional demographic, environmental and mental health variables (ADHD, Crime/Violence, anxiety, depression and internalizing symptoms). Results of the present study support previous findings reporting externalizing symptomatology as one of the more robust and prominent covariates of adolescent SU (see Armstrong & Costello, 2002).

Among males, the presence of depression symptoms when controlling for externalizing symptoms, grade, peer SU, and school closeness results in a lower probability of engaging in SU (see Figure 5). Since, depressive symptoms are associated with withdrawn social behaviours it possible that among males this could lead to social isolation and less contact with peer groups (Wiesner et al., 2005), including substance-using peer groups. Social withdrawal may limit the overall exposure to the other risk factors of SU therefore reducing the overall likelihood of engaging in SU during early adolescence.

As females endorse more depressive symptoms the predicted probability of engaging in SU decreases. Although this effect was not significant it has been reported that females utilize substances as a means of self-medication (Hansel & White, 1991). Among females, use of substances may begin as a partial attempt to decrease emotional distress or symptoms associated with psychopathology (Hansel & White, 1991). This
may explain why females with depression may have an increased risk for engaging in early adolescent SU.

Research on the effect of affective symptomatology (e.g., depression, anxiety) on SU has been inconsistent, with some reports of a protective effect and others suggesting an increased risk of SU (Armstrong & Costello, 2002). Results of the current study provide data on the inconsistency of early adolescent SU and internalizing symptoms suggesting it may be a result of sex differences, such as the one found in the current study with males endorsing more depressive symptoms having a reduced likelihood of engaging in early adolescent SU and no effect for females.

5.4 Limitations

There were several limitations in the current study that should be noted. First, the current sample did not include high-risk youth who are not involved in the school system. High-risk youth include those that are homeless, institutionalized for medical or correctional reasons, involved with special education services or those that have dropped out of school. It is unknown whether including these youth in the analyses would alter the results of the study. It is possible that youth unconnected to the school system may present with divergent risk factors associated with early adolescent SU. Therefore, when interpreting the results of the study it is important to note that they are reflective of a sample of adolescents within the school system and adolescents that received parental consent to participate.

Data gathering methods relied solely on self-report data, which opens up the possibility of bias, such as recall bias on SU behaviours, and non-response bias. Additionally, only ten of the 41-items of the SCARED-R measure, embedded within the
OSDUHS-L, were used in the study. Although the ten items used in current study were the highest correlated items within each of the anxiety subscales measured in the SCARED-R, the abbreviated version of the scale has not been previously used nor validated.

The definition of SU was defined to only include reporting alcohol or illicit SU and did not include tobacco. The study included SU that was either illegal or known to result in disruptive behaviours such as getting intoxicated or high, and therefore did not include tobacco as part of the final SU analyses. However, it would be beneficial for future studies to investigate the use of tobacco and the effect it may have on early adolescent SU as it has been commonly identified as a gateway drug for illicit SU. Additionally, since this was a cross-sectional study, the results do not reflect the onset of substances over time; consequently, it is important to note when interpreting results that causal relationships cannot be determined. Lastly, since the participating schools were randomly chosen from seven pre-selected school boards, the results of the study can only be generalized to reflect students from those school boards versus students’ Ontario-wide. However, when comparing the rates of SU to what was published in the 2011 OSDUHS report, the current sample and the OSDUHS province-wide sample appear to be fairly similar. For example, in the OSDUHS sample 21% of the seventh grade participants and 23% of the eighth grade participants reported illicit SU (Paglia- Boak et al., 2011), which is comparable to what was found in the current study, 18% of the seventh grade students and 22% of the eighth grade students reporting illicit SU. Therefore, results of the study may in fact be reflective of the seventh and eighth grade student population across Ontario.
5.5 Future Research

The current study’s findings report several risk factors of SU during early adolescence. However, it would be beneficial for future research to investigate factors that differentiate the use of substances among adolescents who abstain from SU and later transition to SU initiation compared to those who continue to abstain from the use of substances. Longitudinal studies that assess individuals before and after they engage in SU are necessary to determine the causal relationship between risk factors and SU during early adolescence.

Future studies should also include a larger sample of individuals in both the substance-using and non-substance-using outcome groups. A larger sample would allow for more power in detecting significant factors differentiating substance-using adolescents from non-substance-using adolescents, such as additional sex or regional differences. In terms of the analyses and model used to determine variables associated with SU, a latent class analysis would be able to identify specific groups of substance-using adolescents. Given the many factors that differentiate choice of substances between individuals, future research including a latent class analysis could account for different underlying subgroups of individuals based on their measured characteristics. Individuals may differ based on the type of SU, their demographics, or their mental health, for example.

5.6 Conclusions and Implications

Results of the current study support the importance of peer SU, family closeness, school closeness and mental health issues in the use of substances during early adolescence. These findings suggest that attempts to prevent or delay early adolescent
SU behaviours should consider focusing intervention efforts on these variables (Connell et al., 2007; Dishion et al., 2003; Kosterman et al., 2000).

This study confirms that there are risk factors that can differentiate substance using adolescents from adolescents that abstain from SU in a community-based sample. However, many of the variables shown to be related to SU in previous studies were no longer significant when controlling for the effects of other variables in the final model. When looking at the effect of multiple covariates, adolescents were more likely to engage in SU if they endorsed more externalizing symptoms, and report peer SU. Adolescents were less likely to engage in SU if they were in the seventh versus eighth grade, and reported higher levels of school closeness. Results also indicated males endorsing more depressive symptoms and adolescents of parent(s) born in Canada living in the south Ontario were less likely to report early adolescent SU.

Although many risk factors related to SU exist, research identifying factors related specifically to school-aged adolescents can help prevention and intervention efforts in delaying the use of substances. Based on the results of the study, prevention efforts should (1) focus on identifying adolescents at risk for externalizing disorders during early adolescence to potentially reduce or delay engaging in SU behaviours; (2) educate parents to be aware and monitor the behaviours of their children and discourage the association with substance using peers; and, (3) promote school affiliation and attempt to increase adolescents’ perceived level of closeness to their school to potentially reduce the likelihood of engaging in early adolescent SU.
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APPENDIX A:

ONTARIO DRUG USE AND HEALTH SURVEY - LONGITUDINAL VERSION
2011

STUDENT
SURVEY

THIS IS NOT A TEST. Some of these questions are to find out what students, like yourself, know about alcohol and other drugs (for example, tobacco, cannabis, cocaine, and medical drugs), and how you feel about alcohol and other drugs. This survey also asks about other aspects of your health, and your family and school experiences. There is no assumption that students who answer the questionnaire have ever used alcohol or other drugs or have any other kinds of problems.

Do NOT put your name on this survey. The information you give will be kept completely secret and confidential. Therefore, we ask you to be completely honest and accurate when you answer the questions. If you do not want to answer a question, leave it blank. Also, you may withdraw from the survey at any time.

THANK YOU VERY MUCH FOR YOUR HELP.

01.10.2010
INSTRUCTIONS FOR COMPLETING THIS QUESTIONNAIRE

Most questions are followed by a list of answers. Please choose the answer that is right for you and indicate your choice in one of the boxes to the left.

FOR EXAMPLE:

Which of the following is your favourite subject at school (Choose one).

1  ☐ Math
2  ☐ English or Language Arts
3  ☒ Science
4  ☐ French
5  ☐ Gym
6  ☐ Another subject

BEFORE STARTING TO ANSWER THIS SURVEY, PLEASE INDICATE THE CURRENT TIME.

_______ : _______  (For example, 10:05)
LONGITUDINAL ONTARIO SCHOOL DRUG USE AND HEALTH SURVEY

LOGIN QUESTIONS

These questions will not tell us who you are, but they will allow you to log in if you choose to participate in more surveys in the future.

A1. How many letters are in your last name? _____

A2. How many older brothers do you have (including older stepbrothers)?
   0  No brothers older than me
   1  1 older brother
   2  2 older brothers
   3  3 older brothers
   4  4 older brothers
   5  5 older brothers
   6  6 older brothers
   7  7 older brothers
   8  8 older brothers
   9  9 or more older brothers

A3. How many older sisters do you have (including older stepsisters)?
   0  No sisters older than me
   1  1 older sister
   2  2 older sisters
   3  3 older sisters
   4  4 older sisters
   5  5 older sisters
   6  6 older sisters
   7  7 older sisters
   8  8 older sisters
   9  9 or more older sisters

A4. Have you ever had a dog?  □ Yes  □ No

A5. Have you ever had a cat?  □ Yes  □ No

A6. On which day of the month were you born? __________
    (For example, if you were born on March 27th, write 27 on the line above).
The first few questions are about your background and school life.

B1. How old are you?

10 □ 10 years old or younger
11 □ 11 years
12 □ 12 years
13 □ 13 years
14 □ 14 years
15 □ 15 years
16 □ 16 years old or older

B2. What grade are you in?

07 □ Grade 7
08 □ Grade 8

B3. Are you male or female?

1 □ Male
2 □ Female

B4. Not everyone lives with both parents in one home. Some people spend part of their time in one home, and the other part of their time in another home.

Please choose one of the following statements that best describes your living situation.

1 □ I live in one home only
2 □ I split my time between 2 or more homes

B5. Who lives with you in your main home? (Please CHECK ALL THAT APPLY.)

1 □ Natural mother
1 □ Stepmother
1 □ Adoptive mother
1 □ Natural father
1 □ Steppfather
1 □ Adoptive father
1 □ Grandparent(s)
1 □ Other adult relative(s)
1 □ Foster parent(s)
1 □ Brother(s)/stepbrother(s)
1 □ Sister(s)/stepsister(s)
1 □ Others
1 □ I live alone
B6. How long have you lived in Canada?
1. [ ] All of my life
2. [ ] Less than 1 year
3. [ ] 1 to 2 years
4. [ ] 3 to 5 years
5. [ ] 6 or more years

B7. Which of the following best describes your background? (You may choose more than one category) Are you....?
1. [ ] White (for example, British, French, Italian, Portuguese, Ukrainian, Russian, or Israeli)
2. [ ] Chinese
3. [ ] South Asian (for example, East Indian, Pakistani, Sri Lankan)
4. [ ] Black (for example, African, Caribbean)
5. [ ] Aboriginal/First Nations
6. [ ] Filipino
7. [ ] Latin American, Central American, or South American (for example, Mexican, Brazilian)
8. [ ] Southeast Asian (for example, Vietnamese, Cambodian, Malaysian, Lao tian)
9. [ ] West Asian or Arab (for example, Egyptian, Saudi Arabian, Syrian, Iranian, Lebanese, Afghan)
10. [ ] Korean
11. [ ] Japanese
12. [ ] Not sure

The next few questions are about your parents. By ‘parents’ we mean whoever you consider your parents to be. They could be your natural parents, adoptive parents, foster parents or stepparents.

B8. Were your parents born in Canada?
1. [ ] Both parents were born in Canada
2. [ ] One parent was born in Canada
3. [ ] Neither parent was born in Canada

B9. What is the highest level of education your mother (or Parent 1) completed?
1. [ ] Graduated university
2. [ ] Attended university
3. [ ] Graduated college
4. [ ] Attended college
5. [ ] Graduated high school
6. [ ] Attended high school
7. [ ] Did not attend high school
8. [ ] Don’t know
9. [ ] No mother

B10. What is the highest level of education your father (or Parent 2) completed?
1. [ ] Graduated university
2. [ ] Attended university
3 □ Graduated college
4 □ Attended college
5 □ Graduated high school
6 □ Attended high school
7 □ Did not attend high school
8 □ Don’t know
9 □ No father

B11. In your free time away from home, how often does at least one of your parents know where you are?
1 □ Always
2 □ Usually
3 □ Sometimes
4 □ Rarely
5 □ Never

B12. Imagine this ladder below shows how Canadian society is set up. At the top of the ladder are people who are the best off – they have the most money, the most education, and the jobs that bring the most respect. At the bottom are the people who are worst off – they have the least money, little education, no job or jobs that no one wants.

Now think about your family. Please check off the numbered box that best shows where you think your family would be on this ladder.
The next few questions are about how you feel about school.

B13. Some people like school very much while others don’t. How do you feel about going to school?

1  □ I like school very much
2  □ I like school quite a lot
3  □ I like school to some degree
4  □ I don't like school very much
5  □ I don't like school at all


1  □ Strongly agree
2  □ Somewhat agree
3  □ Somewhat disagree
4  □ Strongly disagree

B15. I feel close to people at this school.

1  □ Strongly agree
2  □ Somewhat agree
3  □ Somewhat disagree
4  □ Strongly disagree

B16. I feel like I am part of this school.

1  □ Strongly agree
2  □ Somewhat agree
3  □ Somewhat disagree
4  □ Strongly disagree

B17. At school, how worried are you that someone will harm you, threaten you, or take something from you?

1  □ Very worried
2  □ Somewhat worried
3  □ Not very worried
4  □ Not at all worried

B18. On average, what marks do you usually get in school? (Please choose only one answer.)

1  □ 90% - 100%
2  □ 80% - 89%
3  □ 70% - 79%
4  □ 60% - 69%
5  □ 50% - 59%
6  □ below 50%
The next section is about your feelings about your family.

B19. My family gives me the moral support I need.
1  □ Yes
2  □ No
3  □ Don’t know

B20. Most other people are closer to their family than I am.
1  □ Yes
2  □ No
3  □ Don’t know

B21. I rely on my family for emotional support.
1  □ Yes
2  □ No
3  □ Don’t know

B22. My family and I are very open about what we think about things.
1  □ Yes
2  □ No
3  □ Don’t know

B23. My family is sensitive to my personal needs.
1  □ Yes
2  □ No
3  □ Don’t know

B24. Members of my family are good at helping me solve problems.
1  □ Yes
2  □ No
3  □ Don’t know

B25. I wish my family were much different.
1  □ Yes
2  □ No
3  □ Don’t know

B26. Have you or your family ever been involved with any Children’s Aid Society, as clients?
1  □ Yes
2  □ No
3  □ Don’t know
The next section is about your physical and emotional health.

B27. How would you rate your physical health?

1  □ Excellent
2  □ Very good
3  □ Good
4  □ Fair
5  □ Poor

B28. Do you think of yourself as being too thin, about the right weight, or too fat?

1  □ Too thin (underweight)
2  □ About the right weight
3  □ Too fat (overweight)

B29. Which of the following are you doing about your weight?

1  □ Not doing anything
2  □ Trying to lose weight
3  □ Trying to keep from gaining weight
4  □ Trying to gain weight

B30. How would you rate your mental or emotional health?

1  □ Excellent
2  □ Very good
3  □ Good
4  □ Fair
5  □ Poor

B31. In the LAST 12 MONTHS, how many times did you see a doctor, nurse or counsellor about your mental or emotional health?

__________ times (Write '0' if you have not seen any of the above for your mental/emotional health)

B32. In the LAST 12 MONTHS, have you called a telephone crisis helpline or gone on a website (such as KidsHelpPhone.ca) because you needed to talk to a counsellor about a problem?

1  □ Yes, I've phoned a helpline only
2  □ Yes, I've posted a question on a website only
3  □ Yes, I've phoned a helpline and posted a question on a website
4  □ No
For the next questions, please rate how often each statement is true for you.

H1. I feel nervous with people I don’t know well.
   0  [ ] Almost never
   1  [ ] Sometimes
   2  [ ] Often

H2. I worry about being as good as other kids.
   0  [ ] Almost never
   1  [ ] Sometimes
   2  [ ] Often

H3. I worry about things working out for me.
   0  [ ] Almost never
   1  [ ] Sometimes
   2  [ ] Often

H4. I worry about other people liking me.
   0  [ ] Almost never
   1  [ ] Sometimes
   2  [ ] Often

H5. I get really frightened for no reason at all.
   0  [ ] Almost never
   1  [ ] Sometimes
   2  [ ] Often

H6. When I get frightened, I feel like I am choking.
   0  [ ] Almost never
   1  [ ] Sometimes
   2  [ ] Often

H7. I am afraid of having anxiety (or panic) attacks.
   0  [ ] Almost never
   1  [ ] Sometimes
   2  [ ] Often

H8. I get in trouble at home.
   0  [ ] Never or not true
   1  [ ] Sometimes / somewhat true
   2  [ ] Often or very true
H9. I get in trouble at school.
0  □ Never or not true
1  □ Sometimes / somewhat true
2  □ Often or very true

H10. I get into arguments with my parents.
0  □ Never or not true
1  □ Sometimes / somewhat true
2  □ Often or very true

H11. I get into arguments with my teachers.
0  □ Never or not true
1  □ Sometimes / somewhat true
2  □ Often or very true

H12. I can't sit still; I am restless.
0  □ Never or not true
1  □ Sometimes / somewhat true
2  □ Often or very true

H13. I am easily distracted. I have trouble sticking to any activity.
0  □ Never or not true
1  □ Sometimes / somewhat true
2  □ Often or very true

H14. I get headaches or stomach aches when I am at school.
0  □ Almost never
1  □ Sometimes
2  □ Often

H15. I worry about going to school.
0  □ Almost never
1  □ Sometimes
2  □ Often

H16. I have trouble concentrating and paying attention.
0  □ Never or not true
1  □ Sometimes / somewhat true
2  □ Often or very true

H17. I worry about bad things happening to my parents.
0  □ Almost never
1  □ Sometimes
2  □ Often
H18. I am impulsive; I act without thinking.

0   □ Never or not true
1   □ Sometimes / somewhat true
2   □ Often or very true
The next questions are about the past year (12 months).

H19. How often (if ever) in the LAST 12 MONTHS, have you done each of the following? (Write ‘0’ if you have not done it.)

a. taken a car, truck, or SUV for a ride without the owner’s permission? ___ times

b. banged up or damaged something (on purpose) that did not belong to you? ___ times

c. sold marijuana or hashish? ___ times

d. taken things worth $50 or less that did not belong to you? ___ times

e. taken things worth more than $50 that did not belong to you? ___ times

f. beat up or hurt anyone (on purpose), not counting fights you may have had with a brother or sister? ___ times

g. broken into a locked building other than your own home? ___ times

h. run away from your home (left home without the permission of one or both of your parents)? ___ times

i. set something on fire that you weren’t supposed to? ___ times
In answering the next questions, think about how you have felt over the last 7 days.

H20. During the LAST 7 DAYS, how often did you enjoy life?

0 □ Never or rarely
1 □ Sometimes
2 □ Often
3 □ Always

H21. During the LAST 7 DAYS, how often have you felt depressed?

0 □ Never or rarely
1 □ Sometimes
2 □ Often
3 □ Always

H22. During the LAST 7 DAYS, how often have you felt hopeful about the future?

0 □ Never or rarely
1 □ Sometimes
2 □ Often
3 □ Always

H23. During the LAST 7 DAYS, how often have you felt like you were too tired to do things?

0 □ Never or rarely
1 □ Sometimes
2 □ Often
3 □ Always

H24. During the LAST 7 DAYS, how often have you felt lonely?

0 □ Never or rarely
1 □ Sometimes
2 □ Often
3 □ Always

H25. During the LAST 7 DAYS, how often have you felt that you could not shake off the blues even with help from others?

0 □ Never or rarely
1 □ Sometimes
2 □ Often
3 □ Always
**H26.** During the **LAST 7 DAYS,** how often have you felt like not eating or your appetite was poor?

- 0 □ Never or rarely
- 1 □ Sometimes
- 2 □ Often
- 3 □ Always

**H27.** During the **LAST 7 DAYS,** how often have you felt that people disliked you?

- 0 □ Never or rarely
- 1 □ Sometimes
- 2 □ Often
- 3 □ Always

**H28.** During the **LAST 7 DAYS,** how often have you had crying spells?

- 0 □ Never or rarely
- 1 □ Sometimes
- 2 □ Often
- 3 □ Always

**H29.** During the **LAST 7 DAYS,** how often have you had trouble keeping your mind on what you were doing?

- 0 □ Never or rarely
- 1 □ Sometimes
- 2 □ Often
- 3 □ Always

**H30.** During the **LAST 7 DAYS,** how often have you been happy?

- 0 □ Never or rarely
- 1 □ Sometimes
- 2 □ Often
- 3 □ Always

**H31.** During the **LAST 7 DAYS,** how often has your sleep been restless?

- 0 □ Never or rarely
- 1 □ Sometimes
- 2 □ Often
- 3 □ Always
The following questions are about some common problems some people have.

Problems are considered significant when:
• you have them for two or more weeks
• they keep coming back
• they keep you from meeting your responsibilities or
• they make you feel like you can’t go on.

H32. When was the last time that you had significant problems with:

a. feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future?
   1 □ Past month (During the past month)
   2 □ 2 to 12 months ago
   3 □ 1+ years (1 year ago or longer)
   6 □ Never

b. sleep trouble, such as bad dreams, sleeping restlessly, or falling asleep during the day?
   1 □ Past month
   2 □ 2 to 12 months ago
   3 □ 1+ years ago
   6 □ Never

c. feeling very anxious, nervous, tense, scared, panicked or like something bad was going to happen?
   1 □ Past month
   2 □ 2 to 12 months ago
   3 □ 1+ years ago
   6 □ Never

d. becoming very distressed and upset when something reminded you of the past?
   1 □ Past month
   2 □ 2 to 12 months ago
   3 □ 1+ years ago
   6 □ Never

e. thinking about ending your life or committing suicide?
   1 □ Past month
   2 □ 2 to 12 months ago
   3 □ 1+ years ago
   6 □ Never
**H33.** In the **LAST 12 MONTHS**, did you attempt suicide?

1 □ Yes  
2 □ No

**H34.** When was the **last time** that you:

- **a. had a disagreement in which you pushed, grabbed, or shoved someone?**
  1 □ Past month (During the past month)  
  2 □ 2 to 12 months ago  
  3 □ 1+ years (1 year ago or longer)  
  6 □ Never

- **b. took something from a store without paying for it?**
  1 □ Past month  
  2 □ 2 to 12 months ago  
  3 □ 1+ years ago  
  6 □ Never

- **c. sold, distributed, or helped to make illegal drugs?**
  1 □ Past month  
  2 □ 2 to 12 months ago  
  3 □ 1+ years ago  
  6 □ Never

- **d. drove a vehicle while under the influence of alcohol or illegal drugs?**
  1 □ Past month  
  2 □ 2 to 12 months ago  
  3 □ 1+ years ago  
  6 □ Never

- **e. purposely damaged or destroyed property that did not belong to you?**
  1 □ Past month  
  2 □ 2 to 12 months ago  
  3 □ 1+ years ago  
  6 □ Never

**H35.** When was the **last time** that you did the following things **two or more times**?

- **f. Lied or conned to get things you wanted or to avoid having to do something?**
  1 □ Past month (During the past month I lied or conned two or more times)  
  2 □ 2 to 12 months ago (Within the past year I lied or conned two or more times)  
  3 □ 1+ years ago (It’s been one year or longer since I lied or conned two or more times)  
  6 □ Never did this or did it only once
g. **Had a hard time paying attention at school, work, or home?**
   1. □ Past month
   2. □ 2 to 12 months ago
   3. □ 1+ years ago
   6. □ Never or only once

h. **Had a hard time listening to instructions at school, work, or home?**
   1. □ Past month
   2. □ 2 to 12 months ago
   3. □ 1+ years ago
   6. □ Never or only once

i. **Were a bully or threatened other people?**
   1. □ Past month
   2. □ 2 to 12 months ago
   3. □ 1+ years ago
   6. □ Never did this or did it only once

j. **Started physical fights with other people?**
   1. □ Past month
   2. □ 2 to 12 months ago
   3. □ 1+ years ago
   6. □ Never did this or did it only once
H36. When was the last time that you had significant problems with:

k. missing meals or throwing up much of what you did eat to control your weight?
   1. Past month (During the past month)
   2. 2 to 12 months ago
   3. 1+ years (1 year ago or longer)
   6. Never

l. eating binges or times when you ate a very large amount of food within a short period of time and then felt guilty?
   1. Past month
   2. 2 to 12 months ago
   3. 1+ years ago
   6. Never

m. being disturbed by memories or dreams of distressing things from the past that you did, saw, or had happen to you?
   1. Past month
   2. 2 to 12 months ago
   3. 1+ years ago
   6. Never

n. thinking or feeling that people are watching you, following you, or out to get you?
   1. Past month
   2. 2 to 12 months ago
   3. 1+ years ago
   6. Never

o. seeing or hearing things that no one else could see or hear, or feeling that someone else could read or control your thoughts?
   1. Past month
   2. 2 to 12 months ago
   3. 1+ years ago
   6. Never
p. videogame playing or internet use that caused you to give up, reduce, or have problems with important activities or people at work, school, home, or social events?
   1  □ Past month
   2  □ 2 to 12 months ago
   3  □ 1+ years ago
   6  □ Never

q. gambling that caused you to give up, reduce, or have problems with important activities or people at work, school, home, or social events?
   1  □ Past month
   2  □ 2 to 12 months ago
   3  □ 1+ years ago
   6  □ Never

H37. In the LAST 12 MONTHS, did you try to cut back or stop playing video games, or did you play for longer than you had planned to?
   1  □ Yes
   2  □ No
   6  □ Don’t play video games

H38. In the LAST 12 MONTHS, have you borrowed money or stolen something in order to bet or to cover gambling debts?
   1  □ Yes
   2  □ No
   3  □ Did not gamble in the last 12 months
   6  □ Never gambled in lifetime
The next section is about alcohol, tobacco and other drugs. Please answer all the questions even if you have never tried these drugs.

S1. In the LAST 12 MONTHS, how often did you drink ALCOHOL — liquor (rum, whiskey, etc.), wine, beer, coolers?

01 □ Drank only at special events (for example, holidays or weddings)
02 □ Had a sip of alcohol to see what it's like
03 □ Once a month or less often
04 □ 2 or 3 times a month
05 □ Once a week
06 □ 2 or 3 times a week
07 □ 4 or 5 times a week
08 □ Almost every day - 6 or 7 times a week
11 □ Drank, but not in the last 12 months
66 □ Never drank alcohol in lifetime

For the following questions, if you do not know what a drug is or have never heard of it, please only choose the ‘don’t know’ box.

S2. In the LAST 12 MONTHS, how often did you use CANNABIS (also known as marijuana, "weed", "pot", "grass", hashish, "hash", hash oil)?

01 □ 1 or 2 times
02 □ 3 to 5 times
03 □ 6 to 9 times
04 □ 10 to 19 times
05 □ 20 to 39 times
06 □ 40 or more times
11 □ Used, but not in the last 12 months
66 □ Never used in lifetime
88 □ Don’t know what cannabis is

S3. In the LAST 12 MONTHS, how often did you sniff GLUE OR OTHER SOLVENTS (for example, airplane glue, nail polish remover, paint thinner, gasoline, etc.) in order to get high?

01 □ 1 or 2 times
02 □ 3 to 5 times
03 □ 6 to 9 times
04 □ 10 to 19 times
05 □ 20 to 39 times
06 □ 40 or more times
11 □ Sniffed glue or another solvent, but not in the last 12 months
66 □ Never sniffed glue or another solvent in lifetime
**S4.** In the **LAST 12 MONTHS**, how often did you use **MDMA** or "**ECSTASY**" (also known as "**E**", "**X**")?

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<th>20 to 39 times</th>
<th>40 or more times</th>
<th>Used, but not in the last 12 months</th>
<th>Never used in lifetime</th>
<th>Don't know what &quot;ecstasy&quot; is</th>
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**S5.** In the **LAST 12 MONTHS**, how often did you use **COCAINE** (also known as "**coke**, "**blow**, "**snow**", "**powder**", "**snort**", etc.)?

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<th>20 to 39 times</th>
<th>40 or more times</th>
<th>Used, but not in the last 12 months</th>
<th>Never used in lifetime</th>
<th>Don't know what cocaine is</th>
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**S6.** In the **LAST 12 MONTHS**, how often did you use **ADRENOCHROMES** (also known as "**wagon wheels**")?

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<th>20 to 39 times</th>
<th>40 or more times</th>
<th>Used, but not in the last 12 months</th>
<th>Never used in lifetime</th>
<th>Don't know what adrenochromes are</th>
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**S7.** In the **LAST 12 MONTHS**, how often did you use a **COUGH OR COLD MEDICINE** from a drug store, such as Robitussin DM, Benylin DM (also known as "**robos**", "**dex**", "**DXM**") in order to get high?

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<th>20 to 39 times</th>
<th>40 or more times</th>
<th>Used, but not in the last 12 months</th>
<th>Never used cough/cold medicine to &quot;get high&quot;</th>
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114
S8.  In the LAST 12 MONTHS, how often did you use other medicines you can buy at a drug store in order to get high?
01 □ 1 or 2 times  
02 □ 3 to 5 times  
03 □ 6 to 9 times  
04 □ 10 to 19 times  
05 □ 20 to 39 times  
06 □ 40 or more times  
11 □ Used, but not in the last 12 months  
66 □ Never used other medicines you can buy at a drug store to “get high”

S9.  In the LAST 12 MONTHS, how often did you use PAIN RELIEF PILLS (such as Percocet, Percodan, Tylenol #3, Demerol, OxyContin, codeine) WITHOUT A PRESCRIPTION or without a doctor telling you to take them? (We do not mean regular Tylenol or Aspirin that anyone can buy in a drugstore.)
01 □ 1 or 2 times  
02 □ 3 to 5 times  
03 □ 6 to 9 times  
04 □ 10 to 19 times  
05 □ 20 to 39 times  
06 □ 40 or more times  
11 □ Used without a prescription, but not in the last 12 months  
66 □ Never used without a prescription  
88 □ Don’t know what pain relief pills are

S10.  Sometimes doctors give medicine to students who are hyperactive or have problems concentrating in school. This is called Attention Deficit Hyperactivity Disorder (ADHD).

In the LAST 12 MONTHS, how often did you use medicine that is usually used to treat ADHD (such as Ritalin, Concerta, Adderall, Dexedrine) WITHOUT A PRESCRIPTION or without a doctor telling you to take it?
01 □ 1 or 2 times  
02 □ 3 to 5 times  
03 □ 6 to 9 times  
04 □ 10 to 19 times  
05 □ 20 to 39 times  
06 □ 40 or more times  
11 □ Used ADHD medicine without a prescription, but not in the last 12 months  
66 □ Never used without a prescription  
88 □ Don’t know what this medicine is
S11. In the **LAST 12 MONTHS**, how often did you use other drugs that require a prescription, either without a prescription or without a doctor telling you to take them?

- 01 □ 1 or 2 times
- 02 □ 3 to 5 times
- 03 □ 6 to 9 times
- 04 □ 10 to 19 times
- 05 □ 20 to 39 times
- 06 □ 40 or more times
- 11 □ Used without a prescription, but not in the last 12 months
- 66 □ Never used without a prescription

S12. In the **LAST 12 MONTHS**, how often did you use any other substances in order to get high?

- 01 □ 1 or 2 times
- 02 □ 3 to 5 times
- 03 □ 6 to 9 times
- 04 □ 10 to 19 times
- 05 □ 20 to 39 times
- 06 □ 40 or more times
- 11 □ Used, but not in the last 12 months
- 66 □ Never used other substances to “get high”

The next few questions are about alcohol. A “drink” of alcohol is a glass of wine, a bottle of beer, a cooler, a shot glass of liquor, or a mixed drink.

S13. When (if ever) did you first drink more than just a few sips of alcohol?

- 04 □ Grade 4 or before
- 05 □ Grade 5
- 06 □ Grade 6
- 07 □ Grade 7
- 08 □ Grade 8
- 66 □ Never drank more than a few sips of alcohol in lifetime

S14. When (if ever) did you first drink enough alcohol to feel drunk?

- 04 □ Grade 4 or before
- 05 □ Grade 5
- 06 □ Grade 6
- 07 □ Grade 7
- 08 □ Grade 8
- 66 □ Never been drunk in lifetime
S15. How many drinks containing alcohol do you have on a typical day when you are drinking?

01   □ 1 drink
02   □ 2 to 3 drinks
03   □ 4 drinks
04   □ 5 to 7 drinks
05   □ 8 or more drinks
61   □ Don’t drink alcohol
66   □ Never drank alcohol in lifetime

S16. How often do you have 5 or more drinks on one occasion?

01   □ Never
02   □ Less than once a month
03   □ About once a month
04   □ About once a week
05   □ Daily or almost daily
60   □ Don’t drink alcohol
66   □ Never drank alcohol in lifetime

S17. When was the last time that:

r. you used alcohol or other drugs weekly or more often?

1   □ Past month (During the past month)
2   □ 2 to 12 months ago
3   □ 1+ years (1 year ago or longer)
4   □ Never

s. you spent a lot of time either getting alcohol or other drugs, using alcohol or other drugs, or feeling the effects of alcohol or other drugs?

1   □ Past month
2   □ 2 to 12 months ago
3   □ 1+ years ago
4   □ Never

t. you kept using alcohol or other drugs even though it was causing social problems, leading to fights, or getting you into trouble with other people?

1   □ Past month
2   □ 2 to 12 months ago
3   □ 1+ years ago
4   □ Never
u. your use of alcohol or other drugs caused you to give up, reduce, or have problems at important activities at work, school, home, or social events?
1 □ Past month
2 □ 2 to 12 months ago
3 □ 1+ years ago
4 □ Never

v. you had withdrawal problems from alcohol or other drugs (like shaky hands, throwing up, having trouble sitting still or sleeping), or that you used any alcohol or other drugs to stop being sick or avoid withdrawal problems?
1 □ Past month
2 □ 2 to 12 months ago
3 □ 1+ years ago
4 □ Never

S18. How often during the LAST 12 MONTHS have you found that you were not able to stop drinking once you had started?
1 □ Never in the last 12 months
2 □ Less than once a month
3 □ About once a month
4 □ About once a week
5 □ Daily or almost daily
6 □ Don’t drink alcohol
7 □ Never drank alcohol in lifetime

S19. How often during the LAST 12 MONTHS have you not done things you were supposed to because of drinking?
1 □ Never in the last 12 months
2 □ Less than once a month
3 □ About once a month
4 □ About once a week
5 □ Daily or almost daily
6 □ Don’t drink alcohol
7 □ Never drank alcohol in lifetime

S20. How often during the LAST 12 MONTHS have you needed a first drink of alcohol in the morning to get yourself going after a heavy drinking session?
1 □ Never in the last 12 months
2 □ Less than once a month
3 □ About once a month
4 □ About once a week
5 □ Daily or almost daily
6 □ Don’t drink alcohol
7 □ Never drank alcohol in lifetime
### S21. How often during the LAST 12 MONTHS have you had a feeling of guilt or remorse after drinking?

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Never in the last 12 months</td>
</tr>
<tr>
<td>2</td>
<td>Less than once a month</td>
</tr>
<tr>
<td>3</td>
<td>About once a month</td>
</tr>
<tr>
<td>4</td>
<td>About once a week</td>
</tr>
<tr>
<td>5</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>6</td>
<td>Don’t drink alcohol</td>
</tr>
<tr>
<td>7</td>
<td>Never drank alcohol in lifetime</td>
</tr>
</tbody>
</table>

### S22. How often during the LAST 12 MONTHS have you been unable to remember what happened the night before because you had been drinking?

<table>
<thead>
<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Never in the last 12 months</td>
</tr>
<tr>
<td>2</td>
<td>Less than once a month</td>
</tr>
<tr>
<td>3</td>
<td>About once a month</td>
</tr>
<tr>
<td>4</td>
<td>About once a week</td>
</tr>
<tr>
<td>5</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>6</td>
<td>Don’t drink alcohol</td>
</tr>
<tr>
<td>7</td>
<td>Never drank alcohol in lifetime</td>
</tr>
</tbody>
</table>

### S23. Have you or someone else been injured as a result of your drinking?

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Yes, but not in the last 12 months</td>
</tr>
<tr>
<td>3</td>
<td>Yes, during the last 12 months</td>
</tr>
<tr>
<td>4</td>
<td>Don’t drink alcohol</td>
</tr>
<tr>
<td>5</td>
<td>Never drank alcohol in lifetime</td>
</tr>
</tbody>
</table>

### S24. Has a relative or friend or a doctor or other health care worker been concerned about your drinking or suggested you cut down?

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Yes, but not in the last 12 months</td>
</tr>
<tr>
<td>3</td>
<td>Yes, during the last 12 months</td>
</tr>
<tr>
<td>4</td>
<td>Don’t drink alcohol</td>
</tr>
<tr>
<td>5</td>
<td>Never drank alcohol in lifetime</td>
</tr>
</tbody>
</table>
Now we have a few questions about drugs other than alcohol (illegal or prescription drugs).

S25. In the LAST 12 MONTHS, did you use drugs to relax, feel better about yourself, or fit in?
   1  □ Yes
   2  □ No
   6  □ Never used drugs in lifetime

S26. In the LAST 12 MONTHS, did you use drugs while you were by yourself?
   1  □ Yes
   2  □ No
   6  □ Never used drugs in lifetime

S27. In the LAST 12 MONTHS, did you forget things you did while using drugs?
   1  □ Yes
   2  □ No
   6  □ Never used drugs in lifetime

S28. In the LAST 12 MONTHS, did you get into trouble while you were using drugs?
   1  □ Yes
   2  □ No
   6  □ Never used drugs in lifetime

S29. In the LAST 12 MONTHS, did your family or friends tell you that you should cut down on your drug use?
   1  □ Yes
   2  □ No
   6  □ Never used drugs in lifetime

S30. Have you been in a treatment program during the LAST 12 MONTHS because of your alcohol or drug use?
   1  □ Yes, for alcohol only
   2  □ Yes, for drugs only
   3  □ Yes, for both alcohol and drugs
   4  □ No
The next few questions are about the drug cannabis (also known as marijuana, hashish, “weed”, “pot”, ‘grass”). Please answer the questions even if you have never tried cannabis.

S31. When (if ever) did you first try cannabis (also known as marijuana, "weed", "grass", "pot", hashish, "hash", hash oil)?

66 Never tried cannabis in lifetime
04 Grade 4 or before
05 Grade 5
06 Grade 6
07 Grade 7
08 Grade 8

S32. In the LAST 3 MONTHS, how often did the idea of missing a smoke of cannabis make you very anxious or worried?

1 Never used cannabis in lifetime
2 Did not use in the last 3 months
3 Never
4 Sometimes
5 Often
6 Always or nearly always

S33. In the LAST 3 MONTHS, how often was your use of cannabis out of control?

1 Never used cannabis in lifetime
2 Did not use in the last 3 months
3 Never
4 Sometimes
5 Often
6 Always or nearly always

S34. In the LAST 3 MONTHS, how much did you worry about your use of cannabis?

1 Never used cannabis in lifetime
2 Did not use in the last 3 months
3 Not at all
4 A little
5 Quite a lot
6 A great deal

S35. In the LAST 3 MONTHS, how often did you wish you could stop using cannabis?

1 Never used cannabis in lifetime
2 Did not use in the last 3 months
3 Never
4 Sometimes
5 Often
6 Always or nearly always
S36. How difficult would it be for you to stop or go without cannabis?
1  □ Don’t use cannabis
2  □ Not difficult
3  □ Quite difficult
4  □ Very difficult
5  □ Impossible

S37. How many of your CLOSEST friends drink alcohol?
1  □ None of my friends
2  □ Some of my friends
3  □ About half of my friends
4  □ Most of my friends
5  □ All of my friends
8  □ Don’t know

S38. How many of your CLOSEST friends use cannabis (marijuana, "weed", "pot")?
1  □ None of my friends
2  □ Some of my friends
3  □ About half of my friends
4  □ Most of my friends
5  □ All of my friends
8  □ Don’t know

S39. How many of your CLOSEST friends use substances other than alcohol or cannabis to get high?
1  □ None of my friends
2  □ Some of my friends
3  □ About half of my friends
4  □ Most of my friends
5  □ All of my friends
8  □ Don’t know

S40. In the LAST 12 MONTHS, how often did you ride in a vehicle driven by someone who had been drinking alcohol?
00  □ Never
01  □ Once
02  □ 2 times
03  □ 3 times
04  □ 4 times
05  □ 5 times
06  □ 6 times
07  □ 7 times
08  □ 8 or more times
88  □ Not sure
S41. In the LAST 12 MONTHS, how often did you ride in a vehicle driven by someone who had been using drugs (other than alcohol)?

00 □ Never
01 □ Once
02 □ 2 times
03 □ 3 times
04 □ 4 times
05 □ 5 times
06 □ 6 times
07 □ 7 times
08 □ 8 or more times
88 □ Not sure

S42. How easy or difficult would it be for you to get alcohol if you wanted some?

1 □ Probably impossible
2 □ Very difficult
3 □ Fairly difficult
4 □ Fairly easy
5 □ Very easy
8 □ Don’t know

S43. How easy or difficult would it be for you to get cannabis (also known as marijuana, “weed”, “grass”, “pot”, hashish, “hash”, hash oil) if you wanted some?

1 □ Probably impossible
2 □ Very difficult
3 □ Fairly difficult
4 □ Fairly easy
5 □ Very easy
8 □ Don’t know

S44. How easy or difficult would it be for you to get prescription pain relief pills (such as Percocet, Percodan, Tylenol #3, Demerol, OxyContin, codeine) if you wanted some – WITHOUT going to a doctor?

1 □ Probably impossible
2 □ Very difficult
3 □ Fairly difficult
4 □ Fairly easy
5 □ Very easy
8 □ Don’t know
S45. How easy or difficult would it be for you to get other prescription drugs if you wanted some – WITHOUT going to a doctor?
1  [ ] Probably impossible
2  [ ] Very difficult
3  [ ] Fairly difficult
4  [ ] Fairly easy
5  [ ] Very easy
8  [ ] Don’t know

S46. When (if ever) did you first smoke a whole cigarette?
66  [ ] Never smoked a whole cigarette
04  [ ] Grade 4 or before
05  [ ] Grade 5
06  [ ] Grade 6
07  [ ] Grade 7
08  [ ] Grade 8

S47. In the LAST 12 MONTHS, how often did you smoke CIGARETTES?
01  [ ] Smoked a few puffs to a whole cigarette in the last 12 months
02  [ ] Smoked more than one cigarette, but not every day
03  [ ] 1 or 2 cigarettes a day
04  [ ] 3 to 5 cigarettes a day
05  [ ] 6 to 10 cigarettes a day
06  [ ] 11 to 15 cigarettes a day
07  [ ] 16 to 20 cigarettes a day
08  [ ] 21 to 29 cigarettes a day
09  [ ] 30 or more cigarettes a day
11  [ ] Smoked, but not in the last 12 months
66  [ ] Never smoked cigarettes in lifetime

S48. Which of the following statements best describes your use of cigarettes IN YOUR LIFETIME?
1  [ ] Never had a cigarette, not even one puff in my life
2  [ ] Smoked from a few puffs to a whole cigarette in my life
3  [ ] Only 2 to 3 cigarettes in my life
4  [ ] More than 3, but fewer than 100 cigarettes in my life
5  [ ] 100 or more cigarettes in my life, but none in the last month
6  [ ] 100 or more cigarettes in my life and some during the last month, but not every day
7  [ ] 100 or more cigarettes in my life and at least 1 cigarette every day during the last month

Thank you for participating in this survey!

Overall, how easy did you find the questionnaire to understand?
1 □ Not at all easy
2 □ Not very easy
3 □ Fairly easy
4 □ Very easy

Please indicate the time you finished this survey.

_____ : _____    (For example, 10:45)