

**EXPLORING THE RELATIONSHIP BETWEEN PERCEIVED NEGLECT AND
VIOLENCE AND PROBLEMATIC ALCOHOL USE IN ADOLESCENTS,
UNDERGRADUATE STUDENTS, AND CLINICAL PATIENTS**

by

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Abstract

The present dissertation aimed to understand how perceived maltreatment including neglect and violence places individuals at risk for problematic alcohol use through the development of a framework of vulnerability. We tested the role of dual process pathways including system 1 (alcohol automatic memory associations) and system 2 (future orientation, and alcohol outcome expectancies) processes, risky personality traits, and current perceived stress as the underlying structure between perceived maltreatment and alcohol use and problematic drinking in three groups of participants: adolescents ($n = 145$), undergraduate students ($n = 510$), and clinical patients under treatment for substance use disorders ($n=100$). In all three groups, perceived maltreatment was associated with higher current perceived stress, development of risky personality traits, and lower future orientation and positive or coping alcohol expectancies. Only maltreated undergraduate students indicated more alcohol-related coping memory associations. In adolescents, more alcohol feeling good expectancy, higher sensation seeking and impulsivity mediated the relationship between violence and recency of alcohol use. In undergraduate students, more alcohol-related coping memory associations, lower future orientation, and higher sensation seeking mediated the relationship between higher frequency of alcohol use and problematic drinking. Higher impulsivity also mediated the relationship between violence and problematic alcohol use in this group. The best dual processes pathway that connected violence to problematic alcohol use was via alcohol coping association and future orientation in undergraduate students, in that those with higher levels of violence showed impaired future orientation, and were more likely to shape alcohol-related coping memory associations, and that this cognitive pathway resulted in higher rates of problematic alcohol use. In general, neglected males and females exposed to violence

indicated a pattern similar to internalizing problems. In contrast, a pattern of externalizing problems were increased in neglected females and males exposed to violence by adding sex to the analysis. Our findings suggest that intervention programs for problematic drinking should consider screening for experiences of violence. Maltreated individuals with alcohol problems would benefit from interventions that improve rational thinking and behavioural inhibition, and learning how to cope effectively with the stress and the experience of maltreatment.

Preface

A version of Chapter 2 is accepted for publication in the journal of “Trauma, Violence, and Abuse”.

The studies presented in this thesis were conducted with the approval of the University of British Columbia Okanagan’s Behavioural Research Ethics Board, under Ethics Certificate H10-01582, H12-03645, and H12-03593, for adolescents, undergraduate students, and clinical sample, respectively. The study procedure and materials was also approved by the Vancouver Coastal Health Authority Research Study, under Ethics Certificate #V12-03593 for clinical group.

Data in adolescents group was collected at Seaton secondary school in Vernon, British Columbia by Dr. Krank. Undergraduate students were recruited through on-line SONA system and in-person from University of British Columbia, Okanagan campus. The data in clinical group was collected at Burnaby Centre for Mental Health and Addiction (BCMHA) in Burnaby, British Columbia by me.

The data analyses were conducted by me and approved by Dr. Krank.

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Dedication

To Shahab

For keeping my dreams alive

“The boy was lying, fast asleep, on a rude bed upon the floor; so pale with anxiety, and sadness, and the closeness of his prison, that he looked like death; not death as it shows in shroud and coffin, but in the guise it wears when life has just departed; when a young and gentle spirit has, but an instant, fled to Heaven, and the gross air of the world has not had time to breathe upon the changing dust it hallowed.”

Oliver Twist by Charles Dickens, Chapter 19

1. Chapter One. Introduction

Exposure to maltreatment and adversity is a common experience among many children and adolescents, occurring at alarming rates. According to the Adverse Childhood Experiences Study (Centers for Disease Control and Prevention, 2009), early adversities are categorized as: abuse (physical, emotional, and sexual abuse), neglect (emotional, and physical), and household dysfunctions, such as substance abuse, mental disorders, incarceration, and parental separation or divorce during childhood. According to Canadian Incidence Study of Reported Child Abuse and Neglect (CIS; Trocmé et al., 2010), of 235,842 maltreatment-related investigations across Canada in 2008, 74% of the investigations were carried out for a concern of neglect or abuse, and 26% of investigations focused on concerns about risk of future maltreatment. 36% of all investigations were substantiated. Among 85,440 substantiated child maltreatment investigations, neglect was the overriding concern accounting for 34% of the cases, followed by physical abuse, emotional maltreatment, and sexual abuse, which accounted for 20%, 9%, and 3% respectively. Intimate partner violence including direct and indirect exposure to physical and emotional violence was also a concern with a rate of 34% of all substantiated cases.

Evidence from longitudinal studies has indicated that Childhood Maltreatment (CM) plays an important role in adolescence, early adulthood, and mid-life psychopathology (Clark, Caldwell, Power, & Stansfeld, 2010; Hankin, 2005; Kessler et al., 2010; Schilling, Aseltine, & Gore, 2007; Tam, Zlotnick, & Robertson, 2003). Among these disorders, Substance Use Disorders (SUDs) have been associated with CM across various populations, including community and clinical patients (Anda et al., 2002; Dube, Anda, Felitti, Edwards, & Croft, 2002; Dube et al., 2006; Edalati, Barkowsky, & Krank, 2011; Enoch, 2011; Langeland &

Hartgers, 1998; Moran, Vuchinich, & Hall, 2004; Simpson & Miller, 2002; Tam et al., 2003; Westermeyer, Wahmanholm, & Thuras, 2001; Windle, Windle, Scheidt, & Miller, 1995). Both longitudinal and cross-sectional studies have confirmed that SUDs are highly influenced by CM, regardless of the population chosen, type of adversity, or methods used to assess these adversities (Dube et al., 2002; Dube et al., 2003; Dunn, Ryan, & Dunn, 1994; Kendler et al., 2000; Nelson et al., 2002). Research on problematic alcohol use has indicated a strong relationship between childhood maltreatment and alcohol abuse (Dube et al., 2006), earlier initiation of drinking in adolescence (Dube et al., 2006; Enoch, 2011; Hamburger, Leeb, & Swahn, 2008), earlier age of onset in heavy and binge drinking (Klonecky, McChargue, & Bruggeman, 2012), and alcohol dependence of dependent patients (Ducci et al., 2009; Medrano, Hatch, Zule, & Desmond, 2002). It has been suggested that all types of CM are associated with a higher risk of alcohol abuse in adulthood (Dube et al., 2002). In addition, exposure to multiple types of maltreatment increases the risk of self-reported alcoholism, and heavy drinking, regardless of parental alcoholism (Dube et al., 2002). CM also increases the risk of earlier onset of illicit drug abuse (Dube et al., 2003) and the rate of illegal substance use in adulthood (Madruga et al., 2011). In patients under treatment, childhood maltreatment negatively influences the course of disorder (Evren, Kural, & Cakmak, 2006; Langeland, Draijer, & van den Brink, 2004) and increases the rate of dropout from treatment (Claus & Kindleberger, 2002). In the general population, people who have experienced two or more childhood maltreatment compared to none are at a higher risk of alcohol abuse even after controlling for socio-demographic and other variables (Pilowsky, Keyes, & Hasin, 2009). In addition, current or former drinkers with histories of CM initiated drinking earlier, and they were more likely to report drinking to cope with problems compared to others (Rothman,

Edwards, Heeren, & Hingson, 2008). History of CM is also associated with the higher rate and severity of comorbid psychiatric disorders in patients with substance dependent diagnosis, such as Post-Traumatic Stress Disorder (PTSD), Major Depressive Disorder (MDD), anxiety disorders, phobia, personality disorders, and the higher rate of suicide attempt (Bernstein, Stein, & Handelsman, 1998; Douglas et al., 2010; Ellason, Ross, Sainton, & Mayran, 1996; Evren et al., 2006; Evren, Evren, Dalbudak, Ozcelik, & Oncu, 2009; Schumacher, Coffey, & Stasiewicz, 2006; Windle et al., 1995). Although numerous research studies have confirmed the relationship between maltreatment and substance use disorders, the nature and characteristics of this relationship is still unclear.

1.1.Theoretical framework

A wide variety of theories have been proposed to explain problematic alcohol use and alcohol dependence. The development of Alcohol Use Disorders (AUDs) is a function of various factors, including genetic predisposition, personality characteristics, socio-cultural factors, and expectancies about the effect of alcohol (e.g., Cooper, Frone, Russell, & Mudar, 1995; Cox & Klinger, 1988; Kong & Bergman, 2010). Two theoretical models have been elaborated to explain how experience of maltreatment during childhood might lead to the development of AUDs: Cascade model (Teicher, Andersen, Polcari, Anderson, & Navalta, 2002), and Dual processing model (Berry & Dienes, 1993; Evans, 2011; Evans, & Coventry, 2006; Evans, 2008; Gawronski & Bodenhausen, 2006; Kahneman, 2011; Nelson, 1995; Ricco & Overton, 2011; Stanovich, 2009b; Stanovich, West, & Toplak, 2011; Strack & Deutsch, 2004; Sun, Slusarz, & Terry, 2005; Tversky & Kahneman, 1981; Wiers & Stacy, 2006).

1.1.1. Cascade model (Teicher et al., 2002)

Evidence from animal and human studies has indicated that childhood maltreatment dramatically impacts the normal development of the brain (Teicher et al., 2002). Exposure to maltreatment in childhood, when the brain has the highest level of plasticity, can lead to permanent changes of multiple brain circuits involved in the processing of environmental stimuli, and also impacts the normal regulation of autonomic, behavioural, and endocrine responses to stress (For a review, see Lupien, McEwen, Gunnar, & Heim, 2009; Tyrka, Price, Marsit, Walters, & Carpenter, 2012). Teicher and colleagues (2002) have proposed a cascade model to explain the effect of childhood maltreatment in later psychopathology, and provided evidence for sensitive periods in development in which specific brain regions are highly vulnerable to the adverse impact of maltreatment (Andersen et al., 2008).

In a series of studies, Teicher and his colleagues (e.g., Andersen et al., 2008; Andersen & Teicher, 2009; Teicher, Ito, Glod, Schiffer, & Gelbard, 1994; Teicher, 1989; Teicher, Anderson, & Polcari, 2012; Teicher et al., 1997; Teicher et al., 2002; Teicher et al., 2003; Teicher et al., 2004) have explained the process in which early maltreatment leads to the alteration in the normal development of the brain as a cascade of events: exposure to early stress activates systems that are involved in response to stress, including glucocorticoid, vasopressin-oxytocin, and noradrenergic systems and consequently, enhances the stress response. The increase in stress hormones adversely influences neural morphology, neurogenesis, synaptogenesis, and myelination, during the critical periods of development. These changes result in alteration in the sensitivity of different brain areas. The severity of the alterations partly depends on genetics, the rate and time of development, sex/gender, and the density of glucocorticoid receptors. Permanent consequences include attenuated development

of hippocampus, amygdala and the left hemisphere, reduced size of the corpus callosum, diminished left/right hemisphere incorporation, reduced activity of the cerebellar vermis, and enhanced electrical activity of limbic system circuits. These changes in the brain are associated with neuropsychiatric problems, and increase the vulnerability to develop psychiatric disorders, such as substance use disorders, PTSD, depression, ADHD, dissociative identity disorder, and borderline personality disorder. A more comprehensive review of how childhood adversity and stress impacts the developing brain and, consequently, leads to cognitive and behavioural deficit is provided in chapter 2, sections 2.1 and 2.2.

1.1.2. Dual processing model

One of the defining factors of substance use disorders is the inability to control the use, despite the awareness of negative consequences and intentions to stop using (American Psychiatric Association, 2013). Why is it so hard to refrain from using? Cognitive science has broadly suggested ‘dual processes’ or ‘dual systems’ to elucidate the process of human reasoning, judgment, and decision making in different situations. Dual processing systems have also received great attention in the literature for explaining the motives of alcohol abuse and dependence (Frigon & Krank, 2009; Krank, Schoenfeld, & Frigon, 2010; Wiers & Stacy, 2006; Wiers, van Woerden, Smulders, & de Jong, 2002). The basic idea of all dual process models is the differentiation between two divergent yet interacting types of cognitive process that govern the behaviour: system 1 and system 2 (e.g., Evans, 2011; Evans, 2008; Kahneman, 2011; Ricco & Overton, 2011; Stanovich, 2009b; Stanovich et al., 2011; Tversky & Kahneman, 1981). Both system 1 and 2 have been named differently in the literature. *System 1* is known as heuristic, autonomous, associative, reactive, emotional, automatic, spontaneous, fast, or implicit system. System 1 is characterized as traces of past experience that mediates

behaviour in a relatively automatic fashion and non-conscious, learned directly from the environment with the least mental effort and often with little or without conscious awareness; draws with minimum effort from associative memory and from available habitual information from procedural memory, and lies on the situation, contextual representations, prior knowledge, and experiences. System 1 is greatly context-dependent; thus, different people may respond differently at different times and under different conditions; it is also very vulnerable to misleading responses or beliefs (Evans, 2008; Stanovich, 2009b; Stanovich, 1999; Stanovich & West, 2000). On the other hand, *System 2* is recognized as the analytic, logical, formal, effortful, systematic, rule-based, rational or explicit system. System 2 involves more conscious, effortful, deliberative, and controlled representations, functions on more de-contextualized representations, related to more slow deliberate choices, restricted by some cognitive system limitations such as working memory capacity (Evans, 2008; Stanovich & West, 2000). Based on dual process models, human behaviours are determined by the competence and imbalance between implicit, automatic or non-conscious associations (system 1), and explicit, controlled or conscious processes (system 2; e.g., Bechara, Noel, & Crone, 2006; Deutsch & Strack, 2006; Kahneman, 2011; Wiers et al., 2007). In the real word, human behaviour is influenced by individual capacity for reasoning and decision making based on the previous knowledge and the current situation and context. Therefore, the human mind is very susceptible to errors and biases, resulting in logical or not logical decisions and behaviours (Evans, 2008; Stanovich, 2009b; Stanovich, 1999).

System 1 (implicit cognition) starts in infancy, and is activated quite directly from the environment, whereas system 2 (explicit cognition) develops later in life, is mostly based on reasoning skills, and involves more conscious forms of learning. These two systems work

through separate brain structures, have discrete developmental paths, and differ in many characteristics (Ricco & Overton, 2011). Therefore, early maltreatment might have distinctive effects on different cognitive systems due to their developmental course and process (e.g., Chaiken & Trope, 1999; Evans, & Coventry, 2006; Haefel et al., 2007). However, it is important to note that the precise impact of maltreatment on the development of system 1 and 2 and their interactions during childhood is likely very complex. As stated by Stanovich and colleagues (2011), drawing developmental predictions from dual cognitive processes should cautiously consider the measurement of each stage of development and the related complexities:

“The complexity of developmental predictions follows from the fact that overall normative responding at a given age derives from several different mental characteristics: (1) the developmental course of Type 1 processing, (2) the developmental course of Type 2 processing, (3) the acquisition of mindware¹ usable by Type 1 processing, (4) the acquisition of mindware usable by Type 2 processing, and (5) the practicing of the mindware available to Type 2 processing to the extent that it is available to be processed in an autonomous manner.” (Stanovich et al., 2011; P 103-118)

‘Mindware’ is a convenient term to describe the procedures, strategies, operations, and other forms of knowledge that are stored in memory and can be retrieved for decision making, reasoning, and problem solving by both the algorithmic and reflective minds (Clark, 2001; Stanovich, 2009a). If the required tools of rationality, such as logical thinking and reasoning, are not fully developed or not learned, a mindware gap happens (Stanovich, 2009a). With regards to childhood maltreatment, exposure to such experiences can lead to the alteration of

¹ ‘Mindware’ is a term first invented by (Perkins, 1995).

brain regions, such as the prefrontal cortex (Teicher et al., 2002; Teicher et al., 2003), which are considered as the underlying brain regions for logical thinking, decision making and reasoning (system 2 processes), and other related functions, such as executive functions and behavioural control. Cognitive abilities for abstract thinking and operational thought also develop during the critical period of childhood (Cole et al., 2008; Gibb & Alloy, 2006), and thus exposure to stress can lead to problems with rational thinking (Abramson, Metalsky, & Alloy, 1989). It has been also reported that maltreated individuals have difficulty in executive functions (Majer, Nater, Lin, Capuron, & Reeves, 2010; McDermott, Westerlund, Zeanah, Nelson, & Fox, 2012), behavioural control (Rosenman & Rodgers, 2006; Rutter, 2002), and reward processing (Dillon et al., 2009; Guyer et al., 2006). Among these characteristics, the role of behavioural control in alcohol and drug abuse seems prominent (Elkins, McGue, & Iacono, 2007). Higher rates of difficulty in behavioural control have been reported as one of the vulnerability markers of alcohol and drug abuse (Mahmood et al., 2013; Nigg et al., 2006). On the other hand, the reinforcing effect of alcohol can lead to shaping memory associations and expectancies that encourage substance use. Memory associations and expectancies about the effects of alcohol use are known as strong predictors of problematic drinking in both cross-sectional and longitudinal studies (Frigon & Krank, 2009; Krank et al., 2010; Wiers & Stacy, 2006; Wiers et al., 2002). In the presence of stress-related cues, memory associations that relate substance use to sedative and coping effects can override the reasoning system that represents the logical and rational knowledge about the effects of substance use. Deficits in attention and working memory which is a concern in individuals with childhood adversities (DePrince, Weinzierl, & Combs, 2009; Pollak et al., 2010; Porter, Lawson, & Bigler, 2005; Raine et al., 2001) can also facilitate the automatic and non-conscious retrieval of memory

associations. In this line, (Barkowsky, 2013) has indicated that executive functions, such as response inhibition and reward sensitivity, moderate the relationship between both system 1 (i.e. implicit memory associations) and system 2 (i.e. explicit outcome expectancies) with substance use in adolescents aged 13-14 years old. Deficit in the reasoning system in addition to dysfunctional memory associations make individuals susceptible to excessive drinking in response to contextual and situational stress. This conclusion is in line with dual system theories that proposed dual processes (procedural vs. competence) for explaining adult judgment, reasoning, and decision making (Berry & Dienes, 1993; Gawronski & Bodenhausen, 2006; Nelson, 1995; Ricco & Overton, 2011; Sun et al., 2005; Wiers & Stacy, 2006). These processes may actively lead to changes in motives for drinking alcohol (Cooper et al., 1995; Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007; Kuntsche, Knibbe, Gmel, & Engels, 2006; Prescott, Cross, Kuhn, Horn, & Kendler, 2004), which may not change due to alcohol-related problems or by age.

In any given situation, both system 1 and system 2 processes can be activated in parallel. For example, an individual may feel an excessive desire for drinking alcohol after he gets upset, while he knows it is not a healthy way to relieve his stress. Similarly, an individual with a history of emotional neglect may feel worthless in an abusive relationship, but despite this knowledge, she can't stop the relationship. Thus, the interaction of these two systems and how automatic processes can override the reasoning system seems very important to explain maladaptive behaviours such as problematic drinking (e.g., Jajodia & Earleywine, 2003; Stacy, 1997; Wiers et al., 2002), particularly in response to stress and negative affect. In the following section, I explained the role of dual processes as the mediating factor in the relationship between maltreatment and problematic alcohol use in the current dissertation.

1.2. Mediating Mechanisms

Despite numerous studies that have shown the relationship between maltreatment and AUDs, little is known about the nature and characteristics of this relationship and the mechanisms underlying it. Previous studies have recognized some factors as mediators of this relationship, including stressful life events, PTSD symptoms (White & Widom, 2008), symptoms of social phobia (DeWit, MacDonald, & Offord, 1999), and drinking motives (Goldstein, Flett, & Wekerle, 2010; Grayson & Nolen-Hoeksema, 2005). Among these factors, drinking motives (i.e., motives to regulate mood) such as drinking to cope with problems and negative mood, and drinking to enhance positive mood are of great importance (Goldstein et al., 2010; Grayson & Nolen-Hoeksema, 2005). More recently, Vilhena (2011) indicated that drinking to cope plays a mediator role in the relationship between all types of maltreatment and alcohol use consequences. Yet, there is no study that tested a comprehensive model of the pathways that make individuals with such histories vulnerable to AUDs.

1.2.1. Dual Processes-System 1

Childhood maltreatment has distinctive effects on different memory systems due to their developmental course and process (e.g., Chaiken & Trope, 1999; Evans, & Coventry, 2006; Haeffel et al., 2007). Based on learning theories (Hintzman, 1988), the specific details and conditions (context) that were encoded at the timing of learning can lead to later retrieval of those memories in the presence of similar retrieval context. As Krank and Wall (2006) summarized, various types of context impact memory retrieval: emotional state (Bower & Forgas, 2001), environmental conditions (Smith & Vela, 2001), social situations (Von Hecker, 2004), drug state (Weingartner, Putnam, & George, 1995), and cognitive processing (Roediger, 1990). The hippocampus is one of the most critical regions in the brain which plays a critical

role in memory formation, storage, and retrieval (Andersen, Morris, Amaral, Bliss, & O'Keefe, 2007), and is central to context effects. The hippocampus is very sensitive to the destructive impacts of childhood stress. Alterations in the hippocampus may lead to increased consolidation of memory traces and continuation of intrusive memories, which are a characteristic feature of PTSD patients (Bremner et al., 1995; Pitman, Orr, & Shalev, 1993). It has been indicated that experience of childhood abuse increases the implicit (automatic) self-anxiety and self-depression associations (van Harmelen et al., 2010). In addition, emotional maltreatment, including emotional neglect and emotional abuse, had the strongest association with increased implicit self-anxiety and self-depression associations compared with sexual and physical abuse. Few studies have investigated the relationship between maltreatment and memory associations; particularly the role of maltreatment as the context for memory formation and retrieval is not clear. Conversely, numerous studies have examined the relationship between substance use and implicit memory associations, and how context can lead to retrieval of specific implicit substance-related cognition. Most of these studies have been focused on alcohol-related implicit associations. These studies are based on using two types of methods for assessing implicit memory associations: Reaction Time (RT) tasks and open ended memory association tasks. Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) is a reaction time task that is usually used in alcohol research to examine reaction times (RTs) to stimuli (like alcohol vs. soda or arousal vs. sedation), and indicates the relative strength of the associations between the concepts (like alcohol and sedation). Studies using IAT suggested that both heavy and light drinkers hold negative alcohol associations, but only heavy drinkers relate alcohol to arousal effect (Wiers et al., 2002). Another study also indicated similar results in individuals under treatment for alcohol dependence in that they

hold both implicit negative and arousal associations with alcohol (De Houwer, Crombez, Koster, & De Beul, 2004). In this regard, incentive-sensitization theory (Robinson & Berridge, 1993) has suggested that chronic use of substances is mostly related to sensitized incentives (wanting) than to attitudes toward substance use (liking). Therefore, chronic substance use increases the likelihood of shaping implicit arousal associations despite the negative attitudes toward using substances (Robinson & Berridge, 1993; Robinson & Berridge, 2003). Negative associations with alcohol use are common in children (Wiers, Gunning, & Sergeant, 1998), and more positive and arousal associations develop later next to the negative associations; this can result in an implicit ambivalence (De Houwer et al., 2004; Krank & Goldstein, 2006; Wiers & Stacy, 2006; Wilson, Lindsey, & Schooler, 2000). Therefore, using alcohol can be connected with both positive and negative implicit associations (De Houwer, 2006; de Jong, Wiers, van de Braak, & Huijding, 2007).

The other method of indirect test of associations includes measuring the memory associations using words, emotions, and situations which can be associated with substance use. Then, responses are coded as their relation to substance use, which shows the relative strength of alcohol and drug use associations (Ames et al., 2007; Frigon & Krank, 2009). Research has confirmed that memory associations assessed with these measures both correlate with (Krank & Wall, 2006) and predict (Krank et al., 2011; Krank et al., 2010) transitions to substance use in youth. More recently, Frigon and Krank (2009) suggested a novel coding procedure, called self-coding, in which participants code their associative responses by themselves. The important advantage of self-coding method over conservative or liberal coding methods is the lower rate of measurement error; it is not influenced by the subjective idea of multiple coders that are often equivocal despite strong training. Self-coding of the

memory associations has been shown to strongly predict the level of alcohol and marijuana use both in adolescents (Frigon & Krank, 2009) and college students (Krank, Schoenfeld, & Frigon, 2010). It has been also indicated to improve the prediction of alcohol and marijuana use over the traditional coding methods (Frigon & Krank, 2009; Krank, Schoenfeld, & Frigon, 2010).

1.2.2. Dual Processes-System 2

As suggested by Stanovich (Stanovich, 2009b; Stanovich et al., 2011), system 2 represents two levels of cognitive control: *algorithmic level* and *reflective level*. Algorithmic level consists of cognitive structures underlying future planning, reasoning, and decision-making. Algorithmic level processes are activated in response to situations or tasks that inquire optimal and maximum performance. Therefore, algorithmic mind represent the efficiency of persuasion of goals and can be measured by cognitive tasks that measure abilities such as intelligence, attention, and working memory performance (see Stanovich, 2009b). In contrast, reflective level consists of practical forms of self-regulation based on available beliefs or knowledge states. Reflective mind is present in situations with less constraint, and in part represents the personal interpretation of the situation. This level of mind can be captured by the measures that assess functions such as epistemic regulation, cognitive style, and consideration of future consequences (Stanovich, 2009b; Stanovich, 1999).

Exposure to maltreatment can lead to impairment of system 2 in both levels. Impairment in algorithmic level has been broadly indicated with various measures of intellectual ability (Ammerman, Cassisi, Hersen, & Van Hasselt, 1986; Loman, Wiik, Frenn, Pollak, & Gunnar, 2009; Perez & Widom, 1994; Pollak et al., 2010; Prasad, Kramer, & Ewing-Cobbs, 2005), attention (Beers & De Bellis, 2002), executive function (Majer et al.,

2010; McDermott et al., 2012), and working memory (DePrince et al., 2009; Pollak et al., 2010; Porter et al., 2005; Raine et al., 2001) in both longitudinal and cross-sectional studies (detailed explanations of these studies are provided in the section 2.2 of the chapter 2). Impairment in reflective level due to early adversity has been also indicated in the literature. For example, individuals who were exposed to maltreatment are more impulsive (Rosenman & Rodgers, 2006; Rutter, 2002) and tend to respond weaker to reward cues compared to those without such a history (Dillon et al., 2009). In addition, the results of a review by Gibb (2002) suggested that there is a significant association between both childhood emotional and sexual maltreatment and negative cognitive styles, which consequently increases the vulnerability to symptoms and diagnoses of depression. In addition, a history of childhood maltreatment is associated with impairment in inhibitory control in childhood (DePrince et al., 2009; Mezzacappa, Kindlon, & Earls, 2001; Pollak et al., 2010), adolescence (Mueller et al., 2010) and adulthood (Navalta, Polcari, Webster, Boghossian, & Teicher, 2006).

One construct that has received extensive attention in the literature is the ability to consider the future consequences of behaviour and the extent to which the potential outcome of behaviour influence the person. Consideration of future consequences as described by Strathman, Gleicher, Boninger, and Edwards (1994) is predictive of a range of behaviours related to self-control (for a review, see Jaireman, Strathman, & Balliet, 2006). It has been found that individuals with high consideration of future consequences show higher self-control, and those with less concern about future consequences indicate lower self-control and higher impulsivity (Jaireman, Anderson, & Strathman, 2003).

Another aspect of system 2 processes that has been broadly investigated before is the alcohol-related expectancies. Alcohol expectancies refer to the beliefs about the effects of

alcohol use, and are known as powerful predictors of alcohol use (Cohen & Fromme, 2002; Greenbaum, Del Boca, Darkes, Wang, & Goldman, 2005). Positive outcome expectancies about drinking predict the rates of alcohol use in college students and young adults (McCarthy, Wall, Brown, & Carr, 2000). To understand how alcohol outcome expectancies impact alcohol consumption, some studies have tested the relationship between alcohol outcome expectancies and some important aspects of drinking behaviour, including the quantity, and the frequency of alcohol use. Findings indicated that outcome expectancies were consistently related to the quantity of drinking rather than the frequency of use among adolescents (Fromme & D'Amico, 2000), college students (Carey, 1995), and community samples (Lee, Greely, & Oei, 1999). Expectancies also explain the growth in the quantity and frequency of drinking, even when demographic factors such as gender and age are considered. The other important association of alcohol expectancies is prediction of changes in drinking behaviour and the development of problems caused by alcohol use (Smith, Goldman, Greenbaum, & Christiansen, 1995), and also the alcohol dependence symptoms (Kilbey, Downey, & Breslau, 1998). In summary, prospective analyses have confirmed that alcohol outcome expectancies predict the initiation and maintenance of drinking alcohol, in addition to the onset of drinking problems.

Chapter 2 provides a comprehensive review of how early maltreatment impairs cognitive functions related to system 2, and how these impairments make individuals with such histories vulnerable to the development of AUDs.

1.2.3. Risk Personality Factors

Childhood maltreatment has a profound impact on development of personality (Nakao et al., 2000; Rutter, 2002). The relationship between childhood adversity and clinically

important aspects of personality factors, including neuroticism, behavioural inhibition, and negative affect, has been indicated in a longitudinal study of 7485 subjects in the age ranges of 20–24, 40–44 and 60–64 years (Rosenman & Rodgers, 2006). Neurotic personality traits, such as depression and anxiety proneness have been also shown to associate with substance abuse. It has been indicated that individuals reporting negative effects (e.g., depression and anxiety) are more prone to negative reinforcement effects of alcohol and drug use (Comeau, Stewart, & Loba, 2001; Cooper et al., 1995). Some studies have also suggested anxiety and depression symptoms as motives for drinking alcohol and alcohol-related problems (Grant et al., 2007; Treeby & Bruno, 2012). Disinhibitory pathways to substance abuse and dependence, including two different personality dimensions: Sensation seeking and Impulsivity, are also of a great interest. Sensation seeking is defined as a desire to experience novel and intense activities. Sensation seeking is associated with self-report motives involving enhancement of positive affect from using alcohol and drugs (Comeau et al., 2001; Cooper et al., 1995; MacPherson, Magidson, Reynolds, Kahler, & Lejuez, 2010). Impulsivity on the other hand is defined as the inability to control behaviour in response to stimuli involving reward or punishment (Arnett, 1994; Eysenck & Eysenck, 1978), and play an important role in the development of substance abuse and dependence (e.g., James & Taylor, 2007; Jones et al., 2011; MacKillop, Mattson, Anderson Mackillop, Castelda, & Donovan, 2007). It has been indicated that a history of childhood maltreatment is associated with impairments in inhibitory control in childhood (DePrince et al., 2009; Mezzacappa et al., 2001; Pollak et al., 2010), adolescence (Mueller et al., 2010), and adulthood (Navalta et al., 2006). Experience of maltreatment was also related to impulsivity directly. For example, a longitudinal study by Bailey and McCloskey (2005) showed that impulsivity mediated the relationship between

childhood sexual abuse and substance use, regardless of demographic characteristics, parenting styles, and psychopathology. Therefore, examining the mediating effect of risky personality characteristics, such as impulsivity can elucidate the relationship between childhood maltreatment and drug and alcohol use.

1.2.4. Current Perceived Stress

Experience of maltreatment increases the vulnerability to the effect of later stressful life events and also predicts continuing exposure to stressful and adverse events and circumstances in those with such histories (Pearlin, 1989). The number of adversities and life adverse events experienced in childhood and adolescence predicts the number of life adverse events and chronic stressors experienced into adulthood (Hazel, Hammen, Brennan, & Najman, 2008; Turner & Butler, 2003; Turner & Turner, 2005). Previous experience of maltreatment can also lead to continued stress and life adverse exposures in elementary and middle school students (Cole, Nolen-Hoeksema, Girgus, & Paul, 2006). The experience of such events might make the person vulnerable to further risk for substance abuse to decrease negative affect, reduce stress, and cope with problems (Jones-Webb, Jacobs, Flack, & Liu, 1996; Leigh, 1989). In a recent study, (Sebena, Ansari, Stock, Orosova, & Mikolajczyk, 2012) indicated that perceived stress was related to more problematic drinking, but not a higher frequency of drinking.

1.3. The Current Dissertation

1.3.1. Neglect and Violence

According to the Canadian Incidence Study of Reported Child Abuse and Neglect (CIS; Trocmé et al., 2010), neglect and violence are the most prevalent form of child maltreatment in Canada each accounting for 34% of all the cases. However, most previous

studies have focused on the physical forms of abuse, such as sexual and physical abuse. For example, a review of publications derived from the three cycles of the CIS between 2001 and October 2011 indicated that while physical abuse attracted most attention, domestic violence was the least studied category of maltreatment (Tonmyr, Ouimet, & Ugnat, 2012). Although neglect and violence are the most prevalent type of maltreatment (Troc   et al., 2010), and are associated with equal or even more severe harms in short and long terms (Dong et al., 2004; Finkelhor, Ormrod, & Turner, 2007b; Grassi-Oliveira, Ashy, & Stein, 2008; Hahm, Lee, Ozonoff, & Van Wert, 2010), surprisingly, they are the least studied category of maltreatment (Behl, Conyngham, & May, 2003; Tonmyr et al., 2012), and usually studied in combination with or as a risk factor for other maltreatment (Tonmyr et al., 2012). Given the adverse consequences of neglect and violence (Anda et al., 2002; Benjet, Borges, Medina-Mora, & Mendez, 2013; Clark et al., 2010; Dube et al., 2002; Dube et al., 2006; Pilowsky et al., 2009; Wright, Fagan, & Pinchevsky, 2013), I focused on the perceived neglect and violence in my dissertation. In the following section, I review some of the studies in regards to the prevalence and negative consequences of neglect and violence.

1.3.1.1. Neglect

Neglect has been consistently reported as the most prevalent category of child maltreatment, and the most frequent reason for reports to child protection systems in Canada and the US (Shlonsky, 2007; Troc   et al., 2010; U.S. Department of Health and Human Services, 2010), yet little research has focused on the specific effects of neglect on development. The definition of neglect is difficult and sometimes fused into a single unit with other types of maltreatment. Neglect is generally defined based on personal perceptions of the experience, while it is not clear what the enough care is. However, neglect is generally

considered as the inadequate or lack of parental care and supervision to meet the basic needs of the child (English, Thompson, Graham, & Briggs, 2005; Tyler, Allison, & Winsler, 2006), or any caregiver behaviour that place a child in situations that includes harm or risk of harm (Sedlak et al., 2008). *Physical neglect* is referred to failure to provide the child needs such as shelter, food, clothing, educational, and healthcare (Bernstein et al., 2003; English et al., 2005). On the other hand, *emotional neglect* is defined as any error or behaviour of the caregiver that could result in cognitive, emotional, behavioural, or mental disorders in child. Emotional neglect is hard to define because it usually leaves no visible injuries and immediate negative consequences (Jellen, McCarroll, & Thayer, 2001; Kaplan, Pelcovitz, & Labruna, 1999). *Supervisory neglect* is the most prevalent type of neglect (Ruiz-Casares, Trocme, & Fallon, 2012; Schumaker, Fallon, & Trocme, 2011), which occurs when caregiver fails to watch a child properly causing physical or emotional harm (Trocme & Wolfe, 2001; U.S. Department of Health and Human Services, 2010). It also involves using insufficient additional care, inadequate protection from a third party and unsafe activities (e.g., leaving a child alone at home or in a car, or exposing a child to violence, child abuse, or inappropriate and illegal activities (Coohey, 2003)). Supervisory neglect or inadequate supervision may cause physical injuries, and emotional, mental, and social negative consequences (Aizer, 2004; Goyette-Ewing, 2000; Morrongiello et al., 2008; Theodore, Chang, & Runyan, 2007).

Research on the effect of neglect has indicated that neglect can result in similar severe consequences as sexual and physical abuse (Hart, Binggeli, & Brassard, 1998; Trickett & McBride-Chang, 1995). In addition, neglect is broadly reported as a chronic situation and not incident-specific similar to what usually occurs in the case of physical or sexual abuse. Neglect has been linked to various short- and long-term negative outcomes (Schumacher,

Slep, & Heyman, 2001), including difficulty in impulse control and problem-solving (Egeland, Sroufe, & Erickson, 1983), problem in intellectual functioning and academic achievement (Erickson, Egeland, & Pianta, 1989), lower IQ and language problem (Gowen, 1993), anxious and insecure attachment styles (Crittenden & Ainsworth, 1989), higher rate of internalizing problems (Manly, Kim, Rogosch, & Cicchetti, 2001), problem in coping and emotion regulation (Pollak, Cicchetti, Hornung, & Reed, 2000), higher hopelessness (Crittenden, 1992), lower self-esteem and higher negative affect (Erickson et al., 1989), diagnoses of personality disorders (Johnson, Cohen, Brown, Smailes, & Bernstein, 1999), elevated symptoms of anxiety and depression (Johnson, Smailes, Cohen, Brown, & Bernstein, 2000), greater current psychological distress and lower cohesion and adaptability (Wark, Kruczek, & Boley, 2003), deficits in recognizing positive pictures (Young & Widom, 2014), and more PTSD symptoms (Grassi-Oliveira et al., 2008). For a review on the effect of childhood neglect on mental health in different developmental stages, please see Hildyard and Wolfe (2002).

Childhood neglect may cause negative impact on normal development through increasing the stress level over time or by triggering the expression of pre-existing genetic susceptibilities (Shonkoff, Boyce, & McEwen, 2009). Both can result in long-lasting changes in normal regulation of the stress system and hypothalamic–pituitary–adrenal (HPA) axis (Gerra et al., 2009), alterations in dopaminergic reward pathways (Andersen & Teicher, 2009) and brain regions such as reduced Corpus Callosum area (Teicher et al., 2004). Alterations in these systems are well-known risk factors associated with substance abuse in neglected individuals (Andersen & Teicher, 2009). Neglect has been connected to vulnerability to substance use (Gerra et al., 2009; Grabe et al., 2010; Schafer et al., 2010), earlier age of the

experimentation with alcohol and drugs, and the severity and duration of substance abuse symptoms (Andersen & Teicher, 2009), and the severity of withdrawal symptoms during treatment of crack cocaine-dependence (Francke, Viola, Tractenberg, & Grassi-Oliveira, 2013). Childhood neglect is also related to depressive symptoms in adulthood (Brensilver, Negriff, Mennen, & Trickett, 2011; Laucht et al., 2013). Research on depression and substance use have suggested a link between severity of depressive symptoms and the increased craving withdrawal symptoms during treatment (Helmus, Downey, Wang, Rhodes, & Schuster, 2001; Sofuoglu, Dudish-Poulsen, Poling, Mooney, & Hatsukami, 2005), suggesting a potential link between neglect and substance abuse. In this line, Francke and colleagues (2013) indicated a strong relationship between the severity of depression and intensity of the abstinence symptoms during treatment of crack cocaine-dependence in neglected individuals, as well as higher severity problems related to alcohol and psychiatric disorders in these individuals compared to others.

Factors such as parental psychopathology and substance use, chronic poverty, serious caregiving deficits, family breakup, and deficient prenatal care are linked to the high risk of child neglect (Pelton, 1994). Neglect strongly influences normal development and in many cases is associated with even more severe cognitive and intellectual deficits, limited social interactions, and more internalizing problems compared to physical and sexual abuse (Hildyard & Wolfe, 2002), however little research has focused on the unique effect of neglect on substance use.

1.3.1.2. Violence

Violence, as mentioned before, is one of the greatest concerns of child maltreatment, and generally refers to violence in the family and community. However, family violence,

including direct exposure to maltreatment and witnessing the violence between parents (indirect) has more negative impact on child than community violence, such as violence in school and the neighborhood. Most previous research has focused on a unique type of maltreatment such as physical or sexual abuse, which usually occur in a specific developmental stage or context (Margolin et al., 2009), however, other studies have recently discussed that maltreatment does not occur in isolation and most individuals exposed to one type of maltreatment also suffered from other types (e.g., Dong et al., 2004; Finkelhor, Turner, Ormond, Hamby, & Kracke, 2009; Finkelhor et al., 2007b; Perkins & Graham-Bermann, 2012). Yet, there are few studies that investigated the effect of cumulative violence that can result in more long-term and severe negative consequences (Dong et al., 2004; Finkelhor et al., 2007b; Hahm et al., 2010; Mrug, Loosier, & Windle, 2008). In this dissertation, I used the term of violence more broadly to refer to any subcategory of maltreatment and included those in the family and community (school and neighborhood) as suggested by Perkins and Graham-Bermann (2012):

“The rationale for the use of the broad term, violence exposure, is twofold. First, multiple studies have shown exposure to one form of violence increases the likelihood of exposure to other forms of violence and also outcomes of violence exposure vary based on severity, developmental stage of the child, and the individual child's developmental trajectory making violence type specific mechanisms unlikely (Andersen et al., 2008; Margolin, Vickerman, Oliver, & Gordis, 2010). In other words, children who experience one form of violence can have a variety of social and emotional behavioral outcomes and children who experience another form of

violence may have the same diversity of outcomes. This necessitates the discussion of violence exposure more broadly.” (Perkins & Graham-Bermann, 2012; P 89-98)

Exposure to violence, and particularly family violence during critical periods of childhood, disrupt the normal development of the neural circuits which underlie the basic mechanisms of cognitive and affective functions (Andersen et al., 2008; Choi, Jeong, Rohan, Polcari, & Teicher, 2009; Seckfort et al., 2008; Sheu, Polcari, Anderson, & Teicher, 2010). Exposure to violence, whether direct or indirect or from family members or friends or even strangers, has consequences on a variety of mental and social functions in children and youth, including greater trauma symptomology (e.g., Finkelhor, Ormrod, & Turner, 2007a; Moylan et al., 2010), repeated victimization (Renner & Slack, 2006), engagement in violence and crime (Margolin et al., 2010; Mrug et al., 2008; Spilsbury et al., 2007), problems in language and social interaction, attachment, and delay in emotion processing (Azar & Wolfe, 2006), and deficits in executive functioning, memory, self-regulation (De Bellis, Hooper, Spratt, & Woolley, 2009; De Bellis, Hooper, Woolley, & Shenk, 2010; DePrince et al., 2009; Seckfort et al., 2008; for a review see Perkins and Graham-Bermann, 2012).

With regards to substance abuse, exposure to violence has been linked to early and problematic substance use (Begle et al., 2011; Fagan, 2003; Hamburger et al., 2008; Schwab-Stone et al., 1995). For example, witnessing two or more episodes of violence compared to none increased the likelihood of using alcohol and illicit drugs for two-fold in youth (Vermeiren, Schwab-Stone, Deboutte, Leckman, & Ruchkin, 2003). Some theories such as stress response theories (Foster & Brooks-Gunn, 2009) suggest that those exposed to violence use alcohol and drugs to cope with problems and relieve negative emotions such as anxiety, low mood and anger. These theories are in line with findings from studies that indicated

exposure to violence is associated with hopelessness, depression, reduced life purpose, and other emotional symptoms, which may make these individuals vulnerable to further alcohol and drug use to alleviate the negative affect (Kilpatrick et al., 2003; O'Keefe, 1997). Using to cope in addition to the problems in emotional regulation and impaired self-control, which is common in those exposed to violence, increases the risk of substance use (Sullivan, Farrell, Kliewer, Vulin-Reynolds, & Valois, 2007).

Some socio-demographic factors such as age, gender, race, and also social contexts (e.g., neighborhood characteristics; Lauritsen, 2001; Saewyc et al., 2009; Scarpa, 2003) may influence the rate of violence and also its impact of on later problems. For example, adolescents and young adults are at higher risk of violence exposure. In addition, being male is usually associated with exposure to public violence, whereas being female is linked to more exposure to intimate partner violence. Moreover, some ethnic minority groups report a higher rate of exposure to violence than heterogeneous communities (Scarpa, 2003).

Although previous studies (Begle et al., 2011; Kilpatrick et al., 2000; Zinzow et al., 2009) have added to the literature by examining the unique effect of different types of violence, there are very limited studies (Wright et al., 2013) that tested the cumulative impact of violence on problematic alcohol drinking. Given that the combined effect of violence is associated with more severe and long-lasting negative consequences (Finkelhor et al., 2007b; Margolin et al., 2009; Margolin et al., 2010), this dissertation seeks to understand the effects of perceived violence at home (abuse and trauma) and community (school, and neighborhood) on problematic alcohol drinking in three different groups of participants.

1.3.1.3. Measure of Perceived Neglect and Violence

Research on the history of maltreatment requires sensitive ethical considerations, particularly for adolescents. Adolescents who participate in research may be concerned that their private thoughts, behaviours and experiences such as illegal drug abuse, underage drinking, and exposure to familial abuse and violence will be disclosed to others, specifically parents, teachers, and friends (Ford, Millstein, Halpern-Felsher, & Irwin, 1997; Klein, Wilson, McNulty, Kapphahn, & Collins, 1999; Lothen-Kline, Howard, Hamburger, Worrell, & Boekeloo, 2003; Reddy, Fleming, & Swain, 2002). A promise to respect the confidentiality can increase the probability that adolescents decently disclose personal information; however, in some cases, the promise of confidentiality might be breakable. Mandatory reporting of abuse and neglect decreases the likelihood of honest disclosure by adolescents, which can seriously influence the results of those studies that requires disclosure of maltreatment experience. In addition, there is evidence that mandatory reporting laws do not necessarily decrease health related problems, as most adolescents are less likely to search for health care and help, when they concern their parents will be noticed (Boekeloo, Schamus, Cheng, & Simmens, 1996; Ford et al., 1997; Klein et al., 1999; Reddy et al., 2002). To fill this gap, we developed a brief measure that consists of non-reportable and more general items that assess relative exposure to familial neglect (physical and emotional) and violence (abuse, trauma and community violence), followed by a post survey information sheet that listed a wide range of agencies that provide legal and mental health support and services for young people who are experiencing mental health issues.

Most items of the neglect and violence questionnaire were derived from the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) and modified to be non-reportable (i.e.

more general) and assess personal agreement with items as part of their life (e.g., Neglect: My family is always there for me; Violence: People older than me are mean to me). This measure was pilot tested with adolescent group with promising reliability (Cronbach's alphas = .82 and .77 for perceived neglect and violence, respectively; Edalati, Barkowsky, & Krank, 2011). The scales also showed a good convergent validity with family attachment correlating negatively with neglect and bullying correlating with violence exposure. The scales also revealed good concurrent validity correlating with increased substance use in this population (Edalati et al., 2011). In a recent study by Edalati and Krank (unpublished manuscript), this measure was used to examine the effect of perceived neglect and violence on initiation and trajectory of alcohol and marijuana use over time in adolescents. Results indicated a significant association between perceived violence and earlier age of initiation of alcohol and marijuana use, and perceived neglect and earlier age of initiation of alcohol use. In addition, both perceived neglect and violence were correlated with higher average and steeper increase in trajectories of alcohol and marijuana use over time.

In the present series of studies, I used this questionnaire to assess perceived neglect and violence. In large measure this choice was practical; research on the history of maltreatment requires sensitive ethical considerations particularly for adolescents. This measure is practical in that it can be used in a general screening setting such as school-based surveys without generating ethical concerns around mandatory reporting or encouraging resistant and possibly deceptive responding. Moreover, this measure is expected to be more sensitive than scales designed to pick up severe maltreatment. Although these measures may serve as valuable screening tools in detecting more serious maltreatment, they are also expected to pick up the lower level effects of violence and neglect on the development of

alcohol use and problems. I used the same questionnaire with two other groups of participants, undergraduate students and clinical patients, to create consistent results in three groups.

Previous studies used both prospective and retrospective methods to assess childhood and adolescence maltreatment. Widom and colleagues (1999) indicated that retrospective report of maltreatment is a better predictor of chronic pain and substance use than prospective findings in the same sample. Also, prospective methods usually include substantiated or officially reported cases of abuse maltreatment, and thus, might underestimate the occurrence of maltreatment. Furthermore, retrospective reports take in cases of maltreatment that protective services could not stop (Kendall-Tackett & Eckenrode, 1996). However, the bias in individual's perception of maltreatment experience can affect the accuracy of retrospective report of maltreatment. For example, it has been indicated that some individuals with substantiated histories of maltreatment do not report these histories as adults (Widom, Raphael, & DuMont, 2004). Other factors, such as current psychopathology, accuracy of memory, relationship with the abuser, and motivation, can affect the retrospective reporting of maltreatment experiences (Briere, 1992).

These limitations raise some interesting questions about the self-identification as a maltreated or abused victim and self-perception of maltreatment experience. Clinical approach emphasized the importance of individual's perception and interpretation of the maltreatment experience (McGee, Wolfe, & Wilson, 1997). One of the implications of the current dissertation is to identify if a measure designed to capture perceived neglect and violence can predict problematic alcohol use in adolescents, undergraduate students, and clinical patients.

1.3.2. Alcohol Use in Canada

Results of the Canadian Alcohol and Drug Use Monitoring Survey (CADUMS; Health Canada, 2012) indicated that the percentage of past-year and current alcohol drinkers has significantly increased from 72.3% in 1994 to 78% in 2004 in total population. However, this rate has declined among youth, 15 to 24 years of age from 82.9% in 2004 to 71.5% in 2010 and 70.0% in 2012 (Health Canada, 2012). Also, the average age of first alcohol consumption among youth has been significantly increased from 15.6 years old in 2004 to 16.2 years old in 2012. In 2012, the rate of drinking alcohol in the past year was similar to the rate reported in 2011 among Canadians (78.4% vs. 78.0%), whereas the rate of past-year drinking among adults aged 25 years and older was higher than youth aged 15 to 24 years old (80.0% vs. 70.0%). However, among drinkers, youths aged 15 to 24 years old were more likely to exceed Low-Risk Drinking Guidelines (LRDG²) compared to adults aged 25 years and older both chronically (24.4% vs. 17.6%) and acutely (17.9% vs. 11.9%).

Based on the Canadian Centre on Substance Abuse (Canadian Centre on Substance Abuse, 2013):

“People who drink within this guideline must drink “no more than 10 drinks³ a week for women, with no more than 2 drinks a day most days and 15 drinks a week for men, with no more than 3 drinks a day most days. Plan non-drinking days every week to avoid developing a habit.” (Low-risk drinking guideline 1 (chronic))

and

“Those who drink within this guideline do so by “drinking no more than 3 drinks (for women) or 4 drinks (for men) on any single occasion. Plan to drink in a safe

2 . Based on alcohol consumption in the past week

3 . Canadian standard drink = 17.05 ml or 13.45 g of ethanol

environment. Stay within the weekly limits outlined" in Guideline 1." (Low-risk drinking guideline 2 (acute))

Similar to previous years, males were more likely than females to report higher percentage of past-year drinking (82.7% vs. 74.4%). Among drinkers, again men tended more to exceed the LRDG chronically (21.2% vs. 15.9%), and acutely (15.8% vs. 9.7%) compared to women (Health Canada, 2012).

Heavy and problematic drinking highly increases the risks of developing alcohol dependence (Butt, Beirness, Gliksman, Paradis, & Stockwell, 2011) and is associated with alcohol-related problems such as violent behaviour, divorce and separation, and work and school problems (Dawson, 2009). Yet, more research is needed to elucidate the risk factors and underlying mechanisms that make individuals vulnerable to problematic drinking and alcohol dependence.

In the present dissertation, I specifically focused on problematic alcohol use, because it is highly prevalent, has serious long-term effects on brain and body, is associated with impairments in occupational, academic and social functions, and has a great impact on society. In addition, a problematic and risky drinking starts in young ages and continues over time.

1.3.3. Rationale and Questions

While previous studies have provided valuable information about the link between maltreatment and alcohol use and related problems, it is unclear to what extent maltreatment in different life stages can prospectively predict problematic alcohol use. In addition, most previous research has focused on more severe types of maltreatment such as sexual and physical abuse with little research on the effect of the more prevalent forms, which are neglect

and violence. Particularly, findings about the effects of neglect and violence have been largely mixed with other maltreatments, and it is not clear how and to what extent exposure to neglect and violence can affect later substance use. Given the adverse consequences of exposure to neglect and violence on psychopathology including alcohol use disorders (e.g., Anda et al., 2002; Benjet et al., 2013; Clark et al., 2010; Dube et al., 2002; Dube et al., 2006; Pilowsky et al., 2009; Wright et al., 2013), I focused on these two forms of maltreatment in my dissertation.

This dissertation proposes to fill important gaps in our knowledge how perceived neglect and violence contributes to problematic alcohol use. To address these issues, the current dissertation focuses on three main questions:

1. What cognitive and personality factors mediate the effects of perceived violence and neglect on problematic alcohol use?
2. How do these factors differ in different risk groups: adolescents, young adults, and patients under treatment for substance use dependence?
3. How do sex differences influence these relationships?

First, which factors mediate the relationship between perceived neglect and violence and problematic alcohol use, and how? To answer this question, I introduced and tested a model that explains how perceived maltreatment places individuals at risk for problematic alcohol use through the development of a framework of vulnerability: as it was reviewed, I suggested dual process systems including system 1 and 2, risky personality characteristics, and current perceived stress as the underlying mechanisms to explain the relationship between perceived maltreatment and problematic alcohol use. To test how system 1 and system 2 processes mediate the pathway between maltreatment (neglect and violence) and problematic

alcohol use, I assessed implicit memory associations as functions of system 1, along with alcohol outcome expectancies, and future orientation (including time perspective, planning ahead, and anticipation of future consequences), as functions of system 2. I also tested the mediating effect of risky personality characteristics, including negative thinking, anxiety sensitivity, impulsivity, and sensation seeking between maltreatment and problematic alcohol use. The other mediating factor that was tested was the current perceived stress to provide a better understanding of the effect of neglect and violence on current stress and problematic alcohol use.

Second, how does perceived maltreatment influence problematic drinking in different high risk groups? As mentioned before, previous studies have linked childhood maltreatment to an earlier initiation of alcohol use in adolescence (Dube et al., 2006; Enoch, 2011; Hamburger et al., 2008), heavy drinking (Dube et al., 2002), and alcohol dependence in dependent patients (Ducci et al., 2009; Medrano et al., 2002). Childhood maltreatment is negatively associated with the course of disorder (Evren et al., 2006; Langeland et al., 2004) and increases the rate of dropout from treatment (Claus & Kindleberger, 2002). However, the potential mechanisms of the link between perceived maltreatment and risky alcohol use are not clear yet. To address this issue, we selected three different age groups with different severity of substance use problems: *adolescence* as a significant developmental period of risk for transitions to alcohol and drug abuse and dependence (e.g., D'Amico & Fromme, 2002; Dawson, Goldstein, Chou, Ruan, & Grant, 2008; Johnston, O'Malley, Bachman, & Schulenberg, 2008); *young adulthood* as the beginning of legal age for drinking alcohol, and because they tend to drink more frequently, and at higher quantities than any other age group, and also a high level of problems related to drinking alcohol in this group (e.g., Adlaf, Demers,

& Gliksman, 2005; Borsari & Carey, 2005; Chan, Neighbors, Gilson, Larimer, & Marlatt, 2007; Flight, 2007; Wechsler et al., 2002); and *patients under treatment for substance use dependence*. To date, there was no study that has explored the mediating factors that link the experience of neglect and violence to problematic alcohol use in three life course stages with different severities of drinking. I selected these three groups as the participants for this dissertation, based on their huge impact on the society, and several calls for novel effective prevention and treatment strategies targeting these groups.

Third, what is the effect of sex differences on the pathway from perceived maltreatment to problematic alcohol use? Some sex differences have been reported by the type of maltreatment and consequences of maltreatment. For example, as a child, boys are more exposed to physical violence, whereas girls are more likely to experience sexual abuse (Acierno et al., 2000; Gwadz, Nish, Leonard, & Strauss, 2007). Although men generally experience more violence in their lives, women are more likely to report chronic effects of experiencing childhood abuse and neglect (Stewart, Ouimette, & Brown, 2002). In addition, women indicate more vulnerability to develop PTSD than men after exposure to trauma and victimization (Cottler, Nishith, & Compton, 2001). There are considerable studies that demonstrated the positive relationship between exposure to maltreatment, particularly sexual abuse and SUDs in women, but there is less evidence showing such a positive relationship in men (Simpson & Miller, 2002; Widom, Marmorstein, & White, 2006). For example, a longitudinal cohort study of middle age individuals (Widom, White, Czaja, & Marmorstein, 2007) indicated that women with court-documented cases of childhood physical and sexual abuse and neglect were more likely to develop SUDs in their middle adulthood, but this relationship was not significant for the men with similar histories. The relationship between

childhood maltreatment and middle-aged drug use was moderated by composite risk factors, including homelessness, prostitution, crime, and poor school performance together with PTSD for women. Childhood maltreatment and mediating factors were not related to adulthood drug use for men (Wilson & Widom, 2009). Similarly, results from a general population sample indicated that childhood maltreatment is significantly related to parental and offspring externalizing behaviours, including substance abuse in women, but not in men (Verona & Sachs-Ericsson, 2005). Besides, childhood maltreatment has been related to higher risk of relapse in the clinical sample of cocaine-dependent women, and not in men (Hyman et al., 2008). However, the severity of childhood emotional abuse has been correlated with higher vulnerability of substance use in both sexes (Hyman, Garcia, & Sinha, 2006). In the Virginia Adult Twin Study of 3,527 men, the rate of AUDs was significantly higher in men who had experienced childhood maltreatment compared to those not exposed to maltreatment. This association has been related to environmental adversities shared between twins (Young-Wolff, Kendler, Ericson, & Prescott, 2011). Further studies are needed to determine the magnitude of sex/gender effect in the relationship between childhood maltreatment and problematic alcohol use.

In this dissertation, I assessed a model of the role of perceived neglect and violence and alcohol use. The results of this study will provide a better understanding of the role of dual cognitive processes, risky personality factors, last month perceived stress, and sex, in three high risk groups, and explain these complex interactions. Studying alcohol use and problematic drinking which are highly prevalent among different populations is a critical issue. Problematic alcohol use has serious long-term effects on brain and body and is associated with impairments in occupational, academic and social functions. Treatment and

prevention of problematic drinking is of overriding importance, and numerous types of interventions have been developed and tested to treat them. Studies have strongly related childhood maltreatment to earlier ages of drinking in adolescence (Dube et al., 2006; Hamburger et al., 2008), and emphasized the fact that earlier ages of drinking onset plays an important role in later adolescents' problematic behaviours (Ellickson, Tucker, & Klein, 2003), harmful drinking and alcohol dependence in later life (Dooley & Prause, 2007; Dougherty, Mathias, Tester, & Marsh, 2004), and negative alcohol-related consequences (Hingson, Heeren, Levenson, Jamanka, & Voas, 2002; Hingson, Heeren, Zakocs, Winter, & Wechsler, 2003; Swahn, Bossarte, & Sullivent, 2008). Therefore, the result of this study may boost the efforts to delay the age of onset of drinking, and thus influence both prevention and treatment strategies. Also recognizing the contribution of multiple traumatic and stressful events to problematic drinking behaviour may help to find the motivations under these behaviours in these three groups, and help to integrate trauma-based interventions into alcohol abuse treatment approaches.

1.3.1. Hypotheses and Research Questions

1. To examine the relationship between perceived maltreatment (neglect and violence) and system 2 processes. I hypothesized that perceived maltreatment is associated with impairment in system 2 processes. Particularly, I hypothesized that those with higher scores of maltreatment indicate lower future orientation. I also hypothesized that they expect more positive and coping effects from drinking alcohol.
2. To explore the relationship between maltreatment (neglect and violence) and implicit memory associations (system 1 processes) for alcohol use. It was hypothesized that maltreated individuals would reveal more coping alcohol-related associations.

3. To test the hypothesis that perceived maltreatment (neglect and violence) is associated with higher levels of last month perceived stress.
4. To examine the relationship between maltreatment (neglect and violence) and risky personality characteristics. It was hypothesized that experience of maltreatment is associated with risky personality characteristics, specifically higher levels of impulsivity.
5. To examine how system 1 and system 2 processes, last month perceived stress, and risky personality characteristics mediate the relationship between perceived maltreatment (neglect and violence) and alcohol use and problematic drinking.
6. To test the role of dual process competence in the path from maltreatment (neglect and violence) to alcohol use and problematic drinking. I hypothesized that maltreated individuals have difficulty in system 2 processes, and are more likely to shape coping implicit associations in relation to drinking alcohol, and that this cognitive pathway results in higher rates of problematic alcohol use.
7. To use a sex lens through the analysis, where it is anticipated that sex differences influence the type of maltreatment experienced, and also moderate their effects on dual process cognitions, last month perceived stress, risky personality characteristics, and problematic alcohol use.

2. Chapter Two. Background

This chapter reviews the evidence for associations between cognitive deficits due to childhood maltreatment and the development of SUDs. We first provide a review of the impact of childhood adversity and stress on the developing brain, and review structural and functional brain deficits associated with childhood adversities. In the second section, we outline current findings of studies that indicated the main cognitive deficits associated with childhood maltreatment, including intellectual performance, memory, attention, and executive functions. We then provide evidence from SUDs studies, and review the longitudinal studies that examine the influence of cognitive deficits on perspective SUDs. Then, we explain the possible intersection of cognitive deficits as a mediator between childhood maltreatment and SUDs, and outline a framework for a better understanding of this relationship. In the final section, we conclude the discussion with some suggestions for the future studies to investigate specific developmental cognitive pathways through which early adversities would make individuals vulnerable to SUDs.

2.1. The Development of Brain Regions in the Presence of Early Stress

Results from the animal and human studies have indicated that the brain is highly sensitive to the adverse effects of stress during early childhood. Exposure to stress during this critical period of development may cause permanent alterations in brain structure and function, and also negatively affect brain reactivity to stress (Hart & Rubia, 2012). Disruption in the normal development of brain regions and neural circuitries is associated with cognitive impairment and psychiatric disorders later in life (Lupien et al., 2009).

The activation of the Hypothalamus-Pituitary-Adrenal (HPA) axis is the most recognized response to stress. Activation of the HPA axis increases the production of

Glucocorticoids (GCs). GCs are part of the stress response systems aimed at turning down the activity of these systems. GCs bind to their specific receptors that are present all over the brain. The activated GCs-receptors complex acts as transcription factors which adversely affects the regulation of gene expressions. As a consequence, increased GCs production triggered by stress can indelibly impact the structure and function of the brain regions that are involved in the regulation of their release (Lupien et al., 2009).

These processes influence different brain regions based on their sensitivity to stress. The most vulnerable brain regions to early stress and childhood maltreatment include the hippocampus, amygdala, cerebellum, prefrontal cortex, corpus callosum and hemispheric integration (Teicher et al., 2002). These regions which continue to develop and generate new neurons after birth showed the highest densities of GC receptors (For a review, see Teicher et al., 2002). Findings from neuroimaging studies in children with histories of CM have revealed the link between abnormalities of these brain regions and cognitive impairments, including impairment in intellectual ability, memory, attention, working memory, and executive functions (Hart & Rubia, 2012).

2.1.1. Brain Regions Vulnerable to Early Stress and Childhood Maltreatment

The amygdala is one of the stress sensitive regions of the brain. The amygdale plays an important role in processing of emotions, emotional memory and nonverbal learning, fear responses, and inhibition of impulsive and aggressive behaviours (Davis & Whalen, 2001). This brain region is critically involved in the activation of the HPA axis in response to threat, fear, and emotional conditions (Dedovic, Duchesne, Andrews, Engert, & Pruessner, 2009). Early maltreatment is associated with abnormalities in amygdale size, impairment in emotion

regulation, and increased anxiety (Pechtel, Lyons-Ruth, Anderson, & Teicher, 2014; Tottenham et al., 2010).

The hippocampus is one of the most critical regions in the brain involved in memory formation, storage and retrieval (Andersen et al., 2007), and is highly sensitive to the destructive effects of childhood stress (Teicher et al., 2003). Previous studies indicated a relationship between CM and reduction of hippocampal volume, which was associated with cognitive deficits, specifically in memory function of clinical samples (Heim & Nemeroff, 2009).

CM adversely impacts hemispheric integration. The cerebral hemispheres are divided into right and left hemispheres, which are connected by the corpus callosum and the posterior and anterior commissures. The corpus callosum consists of a huge band of myelinated fibers that facilitate coordination and communication of the two hemispheres. Early stress is associated with less hemispheric integration and more hemispheric laterality (Schiffer, Teicher, & Papanicolaou, 1995). CM is also related to the impairment of corpus callosum. Teicher and colleagues (1997) first indicated the reduction of middle portions of corpus callosum in abused and neglected children compared to controls. Results from other studies also replicated and extended these findings in children, adolescents and adults with such a history (Choi et al., 2009; De Bellis et al., 2002).

CM affects the cerebellum and cerebellar vermis. The cerebellum is critically involved in motor control and in the regulation of some emotions such as pleasure and fear. It also plays a role in cognitive functions, including language and attention (Riva & Giorgi, 2000). The cerebellar vermis is located in the medial zone of two hemispheres of the cerebellum and has large effects on the key pathways of norepinephrine and dopamine (Reis & Golanov,

1997). Studies on children and adolescents with PTSD diagnosis have indicated that CM is associated with the reduction of vermal and cerebellar volume (De Bellis et al., 2002; De Bellis & Kuchibhatla, 2006). CM alters the normal development of the vermis, and increases vulnerability to drug abuse in these individuals (Anderson, Teicher, Polcari, & Renshaw, 2002).

Another critical brain region impacted by CM is the cerebral cortex. Regions including PreFrontal Cortex (PFC) support higher-order functions of the brain such as decision making, planning, reasoning, inhibition, and other executive functions (Yang & Raine, 2009). PFC contains a high density of GC receptors, and is involved in inhibitory response to HPA axis activity (Diorio, Viau, & Meaney, 1993). Early stress is associated with alteration in the normal development and function of PFC (Carrion et al., 2009). Among all cortical regions, PFC is the only region which continues to develop through adolescence and young adulthood (Lenroot & Giedd, 2006). Structural alterations in the PFC may mediate the relationship between childhood stress and impairments in cognitive abilities, such as spatial working memory (Hanson et al., 2010).

In sum, exposure to CM influences the normal development of different brain regions, including the hippocampus, amygdala, cerebellar vermis, and prefrontal cortex. CM is also associated with EEG abnormalities, enhanced activation of the HPA axis, and diminished left/right hemisphere incorporation, in addition to cognitive impairments and neuropsychiatric disorders (for more information, see Hart & Rubia, 2012; Lupien et al., 2009; Teicher et al., 2002). Most studies conducted in this area did not control for comorbid disorders, and it is not clear whether and/or to what extent the abnormal brain function and impairment of cognitive performance is due to childhood maltreatment or to comorbid disorders.

2.2. Childhood Maltreatment and Cognitive Deficits

Previous research has indicated the relationship between CM and impairments of cognitive function in clinical and general populations (Bremner, Vermetten, Afzal, & Vythilingam, 2004; Navalta et al., 2006). In the following section, we review studies that investigated the relationship between CM and impairment of cognitive functions and processes.

2.2.1. Intellectual Performance

CM may impair academic and intellectual performance in children and adults. For example, early institutionalization (Pollak et al., 2010) and neglect (De Bellis et al., 2009; Kendall-Tackett & Eckenrode, 1996) were associated with impaired academic performance in children. Physical abuse (Carrey, Butter, Persinger, & Bialik, 1995) and sexual abuse (Perez & Widom, 1994) were also related to lower IQ and intellectual development delays in children with such histories compared with control groups. Koenen and colleagues (2003) compared IQ scores of children exposed to domestic violence with children without such histories. They found that domestic violence was associated with lower IQ scores and a dose-related intellectual reduction; this association remained significant after controlling for genetic factors. Some studies emphasized the negative effects of physical abuse on intellectual ability because of the potential neurological damages as a direct result of physical abuse (Kolko, 2002). Others suggested that compared to physical or sexual abuse (Kendall-Tackett & Eckenrode, 1996), neglect has the most adverse effect on intellectual ability and school performance. For example, it was indicated that neglected children achieve low scores on different types of nonverbal and verbal IQ measures (Carrey et al., 1995). Hence, specific types of maltreatment may affect different aspects of intellectual performance.

Most researchers that investigated the adverse effects of CM on intellectual performance have examined children relatively close to the time that maltreatment occurred. Difficulty in intellectual abilities was also reported in adulthood. For example, adults who experienced multiple maltreatment (Majer et al., 2010) or sexual abuse (Navalta et al., 2006) in childhood have difficulties in academic and intellectual tasks later in life. In this regard, Perez and Widom (1994) indicated that adults with maltreatment experience achieved lower scores in IQ and reading tasks compared to controls, even after controlling for socio-demographic factors. Yet, these results have been debated. Some studies that compared maltreated adults with controls did not find significant IQ differences between the groups (Bremner et al., 1995; Bremner et al., 2004). Similar results were found in studies that measured the relationship between CM and intellectual ability in children and adolescents (Saigh, Yasik, Oberfield, Halamandaris, & Bremner, 2006). A small number of studies has controlled for comorbidities of life-time and current psychiatric disorders (Majer et al., 2010). Saigh and colleagues (2006) reported that the association between CM and lower intellectual performance do not exist in the absence of PTSD diagnosis. De Bellis and colleagues (2009) found that lower IQ is associated with CM (i.e., childhood neglect), regardless of PTSD diagnosis, however, neglected children with PTSD received lower scores in many neurocognitive tests. Given the inconsistency of the literature, more precise designs are required to provide a clear understanding of the impact of early maltreatment on intellectual and academic performance.

2.2.2. Memory

Hippocampus plays a key role in shaping memory and learning. Alterations in hippocampus due to CM may lead to impairment of memory functions and processes,

including increased consolidation of the traumatic memory traces and the continuation of intrusive memories which are characteristic features of PTSD patients (Bremner et al., 1995).

Memory processes encode, store, and retrieve information. CM impacts the normal memory process in adulthood (Navalta et al., 2006; Raine et al., 2001). Institutionalization (Bos, Fox, Zeanah, & Nelson Iii, 2009), witnessing domestic violence (Samuelson, Krueger, Burnett, & Wilson, 2010), physical abuse (Yasik, Saigh, Oberfield, & Halamandaris, 2007), sexual abuse (Bremner et al., 2004), mixed maltreatment (Bremner et al., 1995), emotional abuse and physical neglect (Majer et al., 2010), and unspecified maltreatment (Beers & De Bellis, 2002) were associated with impairment of short and long-term memory functions. Deficit in memory function was also related to the severity and duration of maltreatment experience (Bremner et al., 1995; Navalta et al., 2006). For example, a study sexually abused women indicated that duration of abuse is related to the impairment of memory, deficit in short-term, verbal, and visual memory functions (Navalta et al., 2006).

CM also affects memory content. Cognitive science has broadly suggested ‘dual processes’ or ‘dual systems’ to elucidate the process of human reasoning, judgment, and decision making in different situations. The basic idea of all dual process models is the differentiation between two divergent yet interacting types of cognitive process that govern the behaviour: system 1 and system 2 (e.g., Stanovich, 2009b; Tversky & Kahneman, 1981). *System 1* (autonomous or implicit system) is characterized as traces of past experience that mediates behaviour in a relatively automatic fashion and non-conscious, learned directly from the environment with the least mental effort and often with little or without conscious awareness; draws with minimum effort from associative memory and from available habitual information from procedural memory, and lies on the situation, contextual representations,

prior knowledge, and experiences. System 1 is greatly context-dependent; thus, different people may respond differently at different times and under different conditions; it is also very vulnerable to misleading responses or beliefs (Evans, 2008; Stanovich, 2009b). On the other hand, *System 2* (logical or explicit system) involves more conscious, effortful, deliberative, and controlled representations, related to more slow deliberate choices, and is restricted by some cognitive system limitations such as working memory capacity (Evans, 2008). CM has been related to both explicit dysfunctional self-associations, such as maladaptive self-attitudes, self-blame, and low self-worth (Wright, Crawford, & Del Castillo, 2009), and implicit (automatic) self-anxiety and self-depression memory associations (using the same response key for 'me' with either anxious or depressed-related words in Implicit Association Task; van Harmelen et al., 2010). Van Harmelen and colleagues (2010) suggested that childhood emotional maltreatment, including emotional neglect and abuse has the strongest association with increased implicit self-anxiety and self-depression associations compared to sexual and physical abuse. Furthermore, implicit and explicit negative self-associations mediate the relationship between childhood emotional maltreatment and anxiety and depression (van Harmelen et al., 2010). Few studies have explored the relationship between CM and memory associations; particularly the role of maltreatment as a context for memory formation and retrieval is not clear.

Maltreated individuals also indicated impairment in working memory (DePrince et al., 2009). Working memory has a critical role in complex cognitive tasks, including reasoning, language comprehension and learning. Institutionalization (Bos et al., 2009; Pollak et al., 2010) and cumulative maltreatment (DePrince et al., 2009) are associated with lower performance in the working memory tasks in children. Adults with histories of physical abuse

(Raine et al., 2001), and emotional abuse and physical neglect (Majer et al., 2010) also showed impairment in working memory.

Most previous studies examined individuals with comorbid psychiatric disorders. In the studies that compared those with histories of CM with and without PTSD, only those with comorbid PTSD diagnosis showed deficits in verbal memory ability (Beers & De Bellis, 2002; Samuelson et al., 2010; Yasik et al., 2007). Some other studies have failed to find any significant impairment in memory of children (Nolin & Ethier, 2007) and adults (Pederson et al., 2004) exposed to CM.

2.2.3. Attention

Childhood maltreatment has been linked to the impairment of brain regions underlying attention (Hart & Rubia, 2012). Beers and De Bellis (2002) indicated that maltreated children with the diagnosis of PTSD show impairment in sustained attention, and are more vulnerable to distraction compared to controls. In another study, Nolin and Ethier (2007) compared two groups of maltreated children (neglect with and without physical abuse) with a matched control group. Neglected children in both groups (with and without physical abuse) achieved lower scores in auditory attention, response set, and visual-motor integration compared to the controls. A history of childhood abuse is related to the impairment of the domain of attention in patients with first-episode psychosis in comparison with matched controls (Aas et al., 2012). Other studies indicated that institutionalization (Pollak et al., 2010), physical and sexual abuse (DePrince et al., 2009; Porter et al., 2005), physical abuse and neglect (Nolin & Ethier, 2007), and unspecified maltreatment (Beers & De Bellis, 2002) are related to the impairment in visual and auditory attention.

2.2.4. Executive Function

Executive function consists of a set of cognitive processes that are essential to achieve goal-directed behaviours, and to perform adaptively in academic and social functions. The basic components of executive function include the ability to set-shift between changing rules, retention and manipulation of information in working memory, the ability to plan actions, control behaviours, and process of the value of rewards, and the capacity to inhibit impulsive behaviours connected to adverse consequences (Zelazo, Carlson, & Kesek, 2008). Childhood and adolescence are the crucial times for development of these abilities (Williams, Ponesse, Schachar, Logan, & Tannock, 1999). Early stress and CM are associated with anomalous development of executive function (Pechtel & Pizzagalli, 2011). In fact, some of the key brain regions involved in executive function, including prefrontal cortex, are still under development during childhood and adolescence (Teicher et al., 1997). Many studies confirmed the relationship between CM and impairment of executive function (Aas et al., 2012; Mezzacappa et al., 2001), and its sub-functions, such as abstract reasoning (Beers & De Bellis, 2002; Mezzacappa et al., 2001), problem solving and planning (Nolin & Ethier, 2007), response inhibition and inhibitory control (DePrince et al., 2009; Pollak et al., 2010).

The ability to adequately process the value of rewards (i.e., reward processing) is another aspect of executive function that may be affected by CM (Guyer et al., 2006). Results of a study by Dillon and colleagues (2009) indicated that maltreated children show higher rates of depression and anhedonia symptoms, weaker response to, and less positive rating of reward, compared to controls. CM was also related to impairment of inhibitory control in childhood (Pollak et al., 2010), adolescence (Mueller et al., 2010) and adulthood (Navalta et al., 2006).

2.2.5. Summary and Discussion

In the previous sections, we reviewed studies that examined the association between CM and cognitive impairments. Clinical studies in children have confirmed that CM is associated with impairment in cognitive functions such as intellectual and academic performance, memory, attention, and executive function (Beers & De Bellis, 2002; Mezzacappa et al., 2001; Ritchie et al., 2011). The problem remains that only few studies have controlled for comorbidities of current and lifetime psychiatric diagnoses (Majer et al., 2010). Studies including groups without a comorbid diagnosis are generally lacking, and the limited studies that controlled for some comorbidity produced inconsistent outcomes. Additionally, most research only compared individuals with histories of maltreatment with those without such a history. There is a need to compare individuals with similar histories of maltreatment to investigate the potential differences in cognitive function of these individuals. For example, in a study by Nolin and Ethier (2007), neglected children showed difficulty in response set, auditory attention, and visual-motor integration, compared to children in the control group, but only neglected children with physical abuse achieved lower scores in abstraction, problem solving, and planning tasks than the control group. Unexpectedly, neglected children without physical abuse performed better in those tasks than both children with physical abuse and the control group. These findings suggest that negative effects of CM on cognitive function depend on type and severity of maltreatment, and also other environmental factors. Although exposure to physical, sexual or verbal abuse increases the rate of cognitive dysfunction, the impact of neglect may be moderated by other factors (Nolin & Ethier, 2007).

Some studies suggested a possible resilience effect (Ritchie et al., 2011); while those exposed to moderate levels of maltreatment continued to show cognitive dysfunction later in

life, individuals exposed to more severe maltreatment appeared to show reduced susceptibility to cognitive impairment, which suggest a tendency to cope with adversity and stress, and a better problem-solving capacity (Ritchie et al., 2011). Other debates arise from the literature on the interrelationship between cognitive functions; some cognitive functions influence others. For instance, a strong relationship was observed between the general IQ score and specific cognitive abilities such as memory and executive function (Colom, Escorial, Shih, & Privado, 2007).

Some inconsistencies in results also arise from the population of study. Impairment in intellectual and academic abilities has been reported in various studies of maltreated children, but few studies observed the same results in adults with such histories. Many studies suffer from small sample sizes, and lack of explicit and clear criteria for the diagnosis of different types of CM, and did not control for other factors that may affect cognitive abilities (e.g., family dysfunction, socioeconomic situation, and pre-existing characteristics of the individual). It is notable to mention that most prior studies examined the effects of more severe categories of CM (mainly physical and sexual abuse) or the total effect of CM, whereas the impact of neglect or household dysfunction on cognitive impairment is generally ignored.

Future longitudinal studies with large samples are needed to reveal the precise effects of CM on different cognitive functions considering the impact of other factors in various populations.

2.3. Substance Use Disorders and Cognitive Impairment

Chronic substance use is associated with impairments in cognitive functions (Gould, 2010). The most consistently reported impairment is related to executive function, such as deficit in mental flexibility, planning, problem solving, and behavioural inhibition (Bates,

Bowden, & Barry, 2002; Bechara et al., 2001). The majority of prior research has focused on the brain damages following excessive and long-term substance use, and the cognitive impairments that are the indirect consequences of substance use on brain neuronal systems (Crews & Nixon, 2009). Despite the conceptual framework that these studies provided for the relationship between SUDs and cognitive impairments, it is still not clear to what extent these cognitive impairments are due to the long-term neural exposure to drugs or if they existed prior to these exposures.

Rather than focusing on brain impairments related to chronic substance use, the other line of research has addressed the impact of cognitive impairment in the development of SUDs by following vulnerable individuals longitudinally. Although cross-sectional studies recognized the significant relationship between cognitive impairment and SUDs, longitudinal studies have provided more precise designs to indicate the impact of cognitive impairments as a susceptibility factor for the development of SUDs. Of particular interest in this field is the investigation of substance use in adolescents and youth, prior to adulthood. The identification of early cognitive impairments related to the development of SUDs provides a better understanding of these factors and helps to prevent substance-related problems. To determine whether specific cognitive impairment leads to later SUDs, it must be observed prior the onset of drug use, and be able to predict later SUDs. In the following sections, we review some important longitudinal studies that examined the impact of different cognitive impairments on later SUDs.

2.3.1. Intellectual Performance

Few longitudinal studies have investigated the relationship between intellectual abilities and SUDs. In one of the recent longitudinal studies, Ciarrochi, Patrick, and Timothy

(2012) indicated that adolescents with higher intelligence, assessed in early adolescence, started cigarette smoking later, and engaged in more healthy behaviours. Data from a longitudinal British national study indicated that the lower IQ level is associated with higher current smoking and smoking during pregnancy in women (Gale, Johnson, Deary, Schoon, & Batty, 2009). Although, some studies reported lower rates of substance dependence in individuals with intellectual disabilities, substance users in this group are still in a high risk to use drugs (Slayter & Steenrod, 2009). A review by Carroll Chapman and Wu (2012) across several fields revealed that despite the low rate of substance use in individuals with intellectual disabilities, many substance users in these groups suffer excessively from substance-related problems. These researchers emphasized the importance of identifying SUDs in those with mild and borderline intellectual disabilities, and the need for directed and targeted substance use prevention and treatment strategies for this population. More longitudinal research is required to specify the impact of intellectual disabilities in prospective SUDs.

2.3.2. Memory

We could not find any longitudinal study that examined the impact of impairment of memory processes and function on vulnerability to SUDs. Cross-sectional studies have indicated the relationship between substance use and impairment of retrospective memory (Selby & Azrin, 1998), and prospective memory (Arana et al., 2011), and poor ability in working memory (Day, Metrik, Spillane, & Kahler, 2013). However, these studies do not provide adequate support for the impact of impairment in memory processes and functions on SUDs.

2.3.2.1. Memory Content: Implicit Memory Associations

Substance use alters neural systems and brain regions underlying memory and learning processes (Gould, 2010). These changes may develop strong associations between drugs and the situational contexts in which they are encountered (Krank, Wall, Stewart, Wiers, & Goldman, 2005), which is associated with the increased rate of retrieval of drug memory associations in the presence of drug-related contextual cues. However, alcohol and drug-related associations might have already been shaped before the initiation of alcohol and drug use (Wiers, Sergeant, & Gunning, 2000). Dual process models which distinguish between two cognitive processes explain the development and maintenance of SUDs (Wiers & Stacy, 2006). Substance-related context can trigger the activation of system 1 processes, including implicit (automatic) memory associations about the effect of substance use and increases the likelihood of using these substances (Krank et al., 2005; Stacy, Ames, Sussman, & Dent, 1996). Krank and colleagues (The Project on Adolescent Trajectories and Health (PATH); Krank, Wall, Lai, Wekerle, & Johnson, 2003; Krank et al., 2005) followed 1303 adolescents in grade 7, 8, and 9 for 3 years to assess the effects of context manipulation on the predictive value of implicit memory associations with alcohol and drugs. They found that alcohol context enhanced the number of alcohol associations produced. Priming an alcohol context before assessing the implicit memory associations improved the prediction of alcohol use concurrently and prospectively (Krank et al., 2003; Krank et al., 2005).

Most previous studies investigated the impact of alcohol-related implicit memory associations on later alcohol use. Children obtain positive alcohol-related associations through alcohol-related advertisements on media, drinking as a norm in social situations, and most importantly by observing their parents enjoying alcohol drinking (Donovan & Molina, 2008;

Stacy, Zogg, Unger, & Dent, 2004). Van Der Vorst and colleagues (2013) showed that adolescents' perception of parental drinking was positively related to the alcohol-related memory associations and that these memory associations predicted adolescents' alcohol use when assessed in the following year. In two other studies by Pieters and colleagues (2010), paternal and not maternal drinking was associated with explicit arousal and implicit negative associations. These findings are relevant as children generally observe that drinking alcohol has both positive (being more sociable) and negative (increased risk of aggression and incidents) consequences, and also their fathers drink more often and higher amounts of alcohol than mothers (Pieters et al., 2010). In summary, implicit (automatic) memory associations are important predictors of the initiation and maintenance of substance abuse and dependence. Longitudinal studies on other drugs are required to provide a precise understanding of these processes.

2.3.3. Attention

Impairment of sustained attention can lead to decreased feature-intensive processing capacity, the ability to recognize the most important features of pertinent information, and increased risk of SUDs (Sharps, Price-Sharps, Day, Villegas, & Nunes, 2005). Impairment of feature-intensive processing prevents the deep consideration and understanding of related characteristics of risk and decreases effective processing of information relevant to risky behaviours such as substance abuse behaviours (Sharps & Nunes, 2002). These findings suggested a specific role for attention deficit as a neurocognitive marker for the prospective substance use. Impairment of sustained attention has been also reported in children with ADHD diagnosis (Barkley, 2000). To provide a better understanding of the impact of attention

deficit on risk for substance abuse, we review some of the important studies with this population.

2.3.3.1.Children with ADHD Diagnosis

The relationship between childhood diagnosis of ADHD and later SUDs, including heavy cigarette, heavy drinking and alcohol use disorder, cannabis and other illicit substance use, has been well established (e.g., Charach, Yeung, Climans, & Lillie, 2011; Molina & Pelham, 2003). ADHD is characterized with cognitive impairments such as inattention, impulsivity, and hyperactivity that usually appear in children before the onset of substance use; thus, this at-risk population is a significant group for investigating the long-lasting effects of ADHD-related cognitive deficits on later substance use.

Prior research studies indicated the relation between the presence of inattention and substance use in adolescents with ADHD. However, other factors such as symptoms of conduct disorder and aggression may affect this relationship (Elkins et al., 2007). For example, in a 25-year longitudinal study, Fergusson, Horwood, and Ridder (2007) indicated that the impact of childhood attention deficit on later SUDs was mediated by conduct problems. Clearly, more longitudinal studies are required to determine the potential impact of attention deficit in prospective SUDs.

2.3.4. Executive Function

Impairment in various facets of executive function, such as impulse control, decision making, and behavioural inhibition, is a strong predictor of the vulnerability to SUDs (Reynolds, 2006; Tarter, Kirisci, Habeych, Reynolds, & Vanyukov, 2004). The effective ability of impulse control and behavioural inhibition seems fundamental to avoid risky behaviours and situations, including substance use. For example, Romer and colleagues

(2011) assessed executive function by measuring the working memory ability in relationship to two forms of impulsivity (sensation seeking and acting without thinking) in young adolescents to predict their later engagement in risky behaviours, including drug use. They found that acting without thinking is a stronger predictor for the engagement in risky and externalizing behaviours than sensation seeking. These authors suggested that unlike acting without thinking, the impulsivity that is characterized by increased sensation seeking during adolescence is not related to the impairment of executive function (Romer et al., 2011).

Impairment in behavioural inhibition in childhood is also related to many problems, including engagement in risky behaviours (Tarter et al., 1999), psychiatric disorders including ADHD, conduct disorder, earlier initiation of drug use (Tarter et al., 2003), and SUDs in adolescence and adulthood (Tarter et al., 2004). In the following section, we review some of the most important studies that investigated executive function impairments, and in particular, behavioural inhibition as a vulnerability marker of substance use in children with substance dependent parents.

2.3.4.1. Children with Substance Use Dependent Parents

In a series of longitudinal studies, Dawes, Tarter, and Kirisci (1997) followed children of fathers with SUDs and examined the impact of behavioural disinhibition on later SUDs. They used measures of hyperactivity, impulsivity, inattention, and aggression to extract a latent variable representing behavioural disinhibition (Dawes et al., 1997). Results revealed that children of fathers with SUDs show higher rates of behavioural disinhibition. Higher scores in this construct significantly predicted greater frequency of substance use 4–6 years later, and diagnoses of SUDs at 7–9 years follow-up (Tarter et al., 2003). These findings have been supported in other longitudinal studies. For example, Nigg and colleagues (2006)

indicated that the poor behavioural inhibition score at the baseline predicts later alcohol and drug use in a large group of adolescents with paternal alcoholism, compared to controls.

Other studies suggested that the relationship between childhood behavioural disinhibition and later SUDs might exist regardless of parental SUDs. For example, Wong and colleagues (2006) compared children of alcoholics with controls for the impact of behavioural disinhibition on later SUDs. Slower growth in behavioural inhibition significantly predicted an earlier initiation of drug use and elevated drug-related problems in young adulthood. This effect remained significant, regardless of children internalizing/externalizing symptoms and parental alcoholism. In another longitudinal design, Fisher and colleagues (2011) indicated that both parental substance use and early adversity predict behavioural disinhibition in adolescence. Following this study, Lester and colleagues (2012) assessed the impact of behavioural disinhibition in childhood on the initiation of substance use in adolescence. Results showed that childhood behavioural disinhibition is associated with an early initiation of tobacco, alcohol, and other substance use. Taken together, increased behavioural disinhibition during childhood and impulsivity are both known as strong predictors and vulnerability markers for earlier initiation and faster development of SUDs (Clark, Cornelius, Kirisci, & Tarter, 2005; Tarter et al., 2004), and later SUDs (Nigg et al., 2006; Verdejo-Garcia, Lawrence, & Clark, 2008).

2.3.5. Summary and Discussion

In the previous sections, we reviewed some of the important longitudinal studies that examined the impact of cognitive impairments on prospective SUDs. Yet, more research is needed to elucidate the links between cognitive impairments in childhood and risk for development of SUDs in vulnerable individuals. Particularly, longitudinal studies that

assessed the impact of deficit in attention and memory function and process on vulnerability to SUDs are rare.

Most studies that examined the role of impairments of executive function on later SUDs focused on children with ADHD or parental SUDs, and we cannot recognize the precise contribution of cognitive impairments on later SUDs in general population. In addition, previous research broadly assessed the effect of cognitive impairment on the age of onset for substance use in adolescents, and the potential role of other factors, such as hormonal changes, that arises in this developmental period might have been overlooked. For example, enhanced basal and stress-induced activity of the HPA axis during adolescence (Gunnar, Frenn, Wewerka, & Van Ryzin, 2009) may increase the vulnerable to psychiatric disorders such as anxiety and depression (Paus, Keshavan, & Giedd, 2008). These changes can increase sensitivity to SUDs, regardless of cognitive impairments. More longitudinal studies on various populations with different age ranges are needed to provide a clear understanding of the underlying pathways between cognitive impairments and prospective SUDs.

2.4. CM and SUDs: Mediating Pathways of Cognitive Impairments

2.4.1. Critical Findings of the Review

CM has been strongly related to SUDs across various populations, including community and clinical samples (Dube et al., 2006; Enoch, 2011). CM alters the normal development of brain regions and neural circuitries (Teicher et al., 2002; Teicher et al., 2003), which consequently increases the risk of cognitive impairments later in life (Lupien et al., 2009). Alteration in the normal development of the brain may lead to the impairment of systems and functions required for effective reasoning, such as general intelligence, executive functioning, reward processing, and working memory. Similar impairments have been

reported as cognitive vulnerability markers of SUDs in longitudinal studies that examined the role of these impairments prior to the onset of SUDs (Ciarrochi et al., 2012; Romer et al., 2011; Tarter et al., 2003). Impairments in executive function in childhood, particularly behavioural disinhibition and impulsivity, are strong predictors of SUDs liability (Nigg et al., 2006). An explanatory example of this effect is longitudinal studies that examined the impact of childhood behavioural disinhibition on prospective SUDs in children with parental substance use (Kuperman et al., 2005). Parental substance use and dependence has been categorized as one type of childhood adversity (Centers for Disease Control and Prevention, 2009) linked to both cognitive impairments and elevated substance abuse and dependence in children (Nigg et al., 2006). These studies have successfully assessed higher rates of impulsivity and difficulty in behavioural inhibition before the initiation of substance use in these children, and also indicated that these deficits strongly predict later substance use and related problems (Tarter et al., 2003). Furthermore, longitudinal studies on children with ADHD confirmed the effect of high impulsivity, besides inattention, and hyperactivity on later SUDs (Elkins et al., 2007; Ernst et al., 2006). Cognitive abilities for abstract thinking, reasoning, and operational thinking develop during the critical period of childhood (Cole et al., 2008; Gibb & Alloy, 2006), and thus exposure to stress can lead to problems with rational thinking (Abramson et al., 1989). CM is also associated with maladaptive self-attitudes (e.g., self-blame, low self-worth; Wright et al., 2009), and automatic self-anxiety and self-depression memory associations (van Harmelen et al., 2010). Memory associations about the effects of substance use are known as strong predictors of problematic drinking and drug use in both cross-sectional and longitudinal studies (Krank et al., 2010; Wiers & Stacy, 2006).

2.4.2. Understanding the Effect of Childhood Maltreatment on Vulnerability to Substance Use Disorders: A Model of Mediating Pathways of Cognitive Impairments

We suggest that CM places individuals at a particular risk for developing a cognitive framework of vulnerability for SUDs (Figure 1).

First, based on dual process models, human behaviours are determined by the competence and imbalance between procedural, implicit, automatic or non-conscious associations (system 1), and competence, explicit, controlled or conscious processes (system 2; e.g., Stanovich, 2009b; Tversky & Kahneman, 1981). In any certain situation, both system 1 and system 2 are essential for reasoning. The situation determines the engagement level of each system. In some reasoning situations, the system 1 functions independent of the system 2, whereas in other contexts, the procedural system (system 1) may facilitate, support, or override the reasoning system (system 2). System 1 is greatly context-dependent; thus, different people may respond differently at different times and under different conditions; it is also vulnerable to misleading responses or beliefs (Evans, 2008; Stanovich, 2009b). In the real word, human behaviour is influenced by individual capacity for reasoning and decision making based on the previous knowledge and the current situation and context. Therefore, human mind is susceptible to errors and biases, resulting in logical or not logical decisions and behaviours (Evans, 2008; Stanovich, 2009b). For an effective reasoning, one must have the inhibitory mechanisms and essential executive functioning for suppressing and interrupting system 1 process (e.g., dysfunctional memory associations) and its tendency for the automatic response (Stanovich et al., 2011).

Second, CM is associated with dysfunctional memory associations that connect ‘self’ to maladaptive schemas (e.g., blame, and low worth attitudes; Wright et al., 2009), and self-anxiety and self-depression associations (van Harmelen et al., 2010). The reduction of stress can be considered as a potential reinforcement for substance use to relieve tension in response to stressful situations and cues in maltreated individuals. It has been indicated that maltreated individuals are more likely to expect positive effects from drinking alcohol and using drugs to relieve negative emotions, reduce stress, and cope with problems (Goldstein et al., 2010). The reinforcing effects of alcohol and drugs may lead to shaping memory associations that encourage substance use. This approach is also consistent with the tension reduction theory (Cappell & Greeley, 1987; Klanecky et al., 2012). Maltreated individuals are at higher risk of continuing exposure to adverse events and stressful situations (Uhrlass & Gibb, 2007). They are also more sensitized to the effects of life-time and current stressful circumstances (Young-Wolff, Kendler, & Prescott, 2012) and involve in more dysfunctional tension reduction behaviours and emotional regulation struggles to cope with stress and emotions (Hager & Runtz, 2012). Dysfunctional memory associations that relate negative self-associations to the sedative and coping effects of substance use can be shaped and retrieved from the memory in response to contextual cues such as stressful situations and negative emotions, which is a common experience in maltreated individuals (Uhrlass & Gibb, 2007).

Third, early maltreatment impairs the development of systems and functions underlying reasoning and rational thinking, such as general intelligence, executive function, behavioural inhibition, reward processing, and attention. In the presence of stress-related cues, dysfunctional memory associations that relate negative self-associations to coping and sedative effects of substance use can override the reasoning system that represents the logical

and rational knowledge about the adverse consequences of substance use. Impairment in attention, working memory, and the intellectual performance which is a concern in maltreated individuals (DePrince et al., 2009; Pollak et al., 2010; Porter et al., 2005; Raine et al., 2001) can facilitate the automatic and non-conscious retrieval of memory associations. Maltreated individuals may not be able to suppress and interrupt dysfunctional memory associations (system 1 process) and their tendencies for the automatic response to contextual stress. The impulsive substance use in response to contextual stress is an example of the override of the dysfunctional procedural system on the reasoning system that can result in change of motivation for substance use over time (Cooper et al., 1995; Kuntsche et al., 2006).

The proposed model still needs to be tested in a comprehensive longitudinal study considering all these interacting factors. It is important to note that the precise impact of CM on the development of system 1 and 2 and their interactions during childhood is likely very complex. Early maltreatment might have distinctive effects on different cognitive systems due to their developmental course and process. Drawing developmental predictions from dual cognitive processes should cautiously consider the measurement of each stage of development and the related complexities (Stanovich et al., 2011). In addition, the model should be treated with caution with regards to different aspects of maltreatment experience (e.g., type, timing, duration, and frequency of exposure) that may affect the consequences of exposure on neural and cognitive functions and later psychopathology including SUDs.

2.5. Conclusions and Future Directions

Overall, various studies have provided a relatively strong relationship between CM and vulnerability to SUDs. CM is associated with the alteration in structure and function of the brain regions and consequently, impairments in cognitive abilities. However, most studies

3. Chapter Three. Assessments

3.1. Participants

A total of 755 participants were considered for this study in three different groups with different ages and severity of alcohol use:

3.1.1. Adolescents

Middle school students (n = 145) aged 13-19 in grade five to twelve were participated. Participants were recruited from a large school district in the Southern Interior region of British Columbia (Okanagan area). All students in a convenience sample of classrooms that had access to computer labs and received the Health and Career Education curriculum participated in the study. The sample was balanced by gender.

3.1.2. Undergraduate Students

Undergraduate students (n = 510) were recruited from University of British Columbia, Okanagan campus and assessed through SONA system. SONA is a tool that is used at the UBC Okanagan campus for conducting psychological studies both on-campus (in-person) and off-campus (online). Participants were assessed through on-line SONA tool.

3.1.3. Clinical Patients

This part of the study was conducted in the Burnaby Centre for Mental Health and Addiction (BCMHA), which is a specialized treatment center for substance use disorders with 100 inpatient beds, and accepts patients from all over British Columbia. A total of one hundred admitted adult patients with substance dependence (n=100) were considered for participation in this study. To be included in this study, participants had an age between 19 to 60 years, literate in English, and fit the Diagnostic and Statistical Manual for Mental Disorders, Fifth edition (DSM-5; American Psychiatric Association, 2013) diagnostic criteria

for Substance Use Disorders (SUDs). The excluding criteria were illiteracy, mental retardation or cognitive impairments. All the patients who fulfilled the criteria for this study were introduced to the research investigator by one of the staff in BCMHA.

3.2. Measures

All assessment materials were presented on a web-based delivery; thus participants could take part in the studies by opening the website address that was provided for them.

3.2.1. Automatic Alcohol Associations

To assess automatic alcohol-related associations, I used an indirect open-ended association measure with that assesses the top of mind, automatic associations in response to ambiguous words and behaviour intentions (Frigon & Krank, 2009; Stacy, 1995; Stacy, 1997). Participants were asked to type the first word, phrase, or behaviour that they think of when they see a word (Word Associations) or behaviour (Behaviour Associations). We used alcohol-related ambiguous words, such as cooler, shot, bottle, screw, ice (Stacy, 1995; Stacy, 1997), and four categories of behaviours (situations and emotions), including Coping (e.g., If I want to relax, then I will...; If I feel upset or depressed, then I will...), Social (e.g., If I want to fit in or feel more included with my peers, then I will...), Celebrate (e.g., If I am going to a party, then I will...), and Sex (e.g., If I want to be more sexually desirable, then I will...) to predict risk of alcohol use in relation to these behaviours. We did not use the “sex” categories for adolescents, as these questions were precluded by ethics for this age group.

In the next stage, participants were asked to categorize their own responses that are generated by the computer according to a range of options including alcohol use. The self-coding method developed by Krank and colleagues (Frigon & Krank, 2009; Krank et al., 2010) has been shown to strongly predict the level of alcohol and marijuana use and also improved

the prediction of alcohol and marijuana use over the traditional coding methods (Frigon & Krank, 2009; Krank et al., 2010). In the current dissertation, we used a combined score that summed all “alcohol” responses to relevant stem items.

3.2.2. Open-Ended Outcome Expectancy

I used an open-ended outcome expectancy measure to assess top of mind associations with using alcohol. Using this measure, participants indicate four things they think would be most likely to happen if they drank alcohol (a moderate amount of alcohol; for undergraduate students and clinical patients). As participants generate these options, they are also asked to rate how much they would like or not like the outcome on a five point Likert scale. The average liking response for alcohol comprises the alcohol outcome expectancy liking (AOEL). The AOEL measure used in this study has been shown to predict substance use initiation, levels, and rate of escalation in adolescents (Fulton, Krank, & Stewart, 2012).

The present studies added an additional category coding selection to allow participants to identify the type of expectancy they had generated. Participants in the undergraduate students’ group and the clinical patients were asked to answer if their responses are related to any five categories of “Letting Go”, “Dealing with Difficulties”, “Enjoying Things”, “Impairment”, “Enhancing Experience”. We used different categories for adolescents to make it more understandable for them. These four categories included “Feeling Good”, “Feeling Better”, “Feeling Bad”, and “Feeling Worse”.

3.2.3. Substance Use Risk Personality Scale

Substance Use Risk Profile Scale (SURPS; Woicik, Stewart, Pihl, & Conrod, 2009) which is a 23-item questionnaire was used to assess Anxiety Sensitivity (AS), Negative Thinking (NT), Impulsivity (IMP), and Sensation Seeking (SS). In addition to good internal

consistency and acceptable test-retest reliability, the SURPS scale has shown concurrent and predictive validity for substance use (Krank et al., 2011; Woicik et al., 2009). Recent work has also shown that these personality measures have good specificity for the individual subscales and good sensitivity for the overall scale (Krank et al., 2011).

3.2.4. Future Orientation Scale

A 15-item self-report measure was used to assess future orientation (Steinberg et al., 2009). This measure consists of 3 subscales: *time perspective*, *planning ahead*, and *anticipation of future consequences*. Participants will be asked to choose their best descriptor statement among a series of 10 pairs of statements separated by the word BUT (e.g., “Some people would rather be happy today than take their chances on what might happen in the future BUT Other people will give up their happiness now so that they can get what they want in the future”). Then, participant will be asked whether the description is really true or sort of true and code them on a 4-point scale ranging from really true for one descriptor to really true for the other descriptor and averaged. Higher scores show greater future orientation. The validity of the measurement was shown in previous study (Steinberg et al., 2009).

3.2.5. Perceived Stress Scale

The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) consists of 14 items that assess the appraisal of recent life situations as stressful. Using a 5-point scale ranging from 0 (never) to 4 (very often), participants indicate how often they had certain thoughts, feelings, or reactions in the past month (e.g., “In the last month, how often have you felt that you were unable to control the important things in your life?”). PSS is the most widely used measure for assessing perception of stress. Higher scores in perceived stress scale represent a higher level of current stress level, and current stress appraisal. It also reflects how

individuals perceive their lives as uncontrollable, unpredictable, and overloaded. The PSS has shown good internal consistency and test-retest reliability (Cohen et al., 1983).

3.2.6. Alcohol Use

Levels of alcohol use were assessed in a hierarchical fashion, in that initial questions identify whether participants have ever drunk alcohol or not. Positive responses were followed with a more detailed analysis asking about last time the individual drank alcohol (Recency), offering an ordinal range of possible answers from “never” to “the past week” (0 to 4), Frequency of use in the past month (0 to 31 days), and typical number of drinks per occasion (Quantity). This method is particularly important for measurement of substance abuse in adolescents, because those who report not using alcohol or drugs do not see the following questions that ask about the frequency and quantity of use which might encourage them to use.

3.2.7. Problematic Alcohol Use

Problematic alcohol use was assessed by the Alcohol Use Disorders Identification Test (AUDIT). AUDIT is a 10-item questionnaire that was developed for the World Health Organization (WHO) to identify hazardous alcohol use (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). It has been originally designed for adults, it is also appropriate to use for adolescents (Chung et al., 2000; Reinert & Allen, 2007). Questionnaire consists of questions asking about the quantity and frequency of drinking (three questions), alcohol dependency (three questions), adverse psychological reactions (two questions), and problems caused by alcohol use (two questions), offering an ordinal range of possible answers from “never” to “the past week” (0 to 4; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Given that AUDIT measure problematic alcohol use at the low end of the spectrum, and also in a way as

to reduce under-reporting, participants are more likely to respond with honesty. The total score in AUDIT is calculated as 0 to 40 where a score of 8 or more indicates problematic alcohol use and alcohol dependence.

3.2.8. Perceived Neglect and Violence

To assess the experience of maltreatment, I used a brief 12-items measure that we developed to assess relative exposure to neglect and violence (perceived neglect and violence) in adolescents. Items from the subsets of Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) and other sources were selected and modified to be non-reportable (i.e. more general), and assess personal agreement with the items as part of their life (e.g., Neglect: My family is always there for me; Violence: I have seen a lot of violence in my life). This scale assesses neglect (physical and emotional), and violence (family, and community including school and neighborhood), and is a scale that has been pilot tested with adolescents with a promising reliability and concurrent validity for substance use in adolescents (Edalati et al., 2011). In the current dissertation, internal consistency estimates (Cronbach's alphas) were good to excellent: $\alpha = .76$ and $\alpha = .82$ for violence and neglect in adolescents; $\alpha = .77$ and $\alpha = .83$ for violence and neglect in the undergraduate students; and $\alpha = .72$ and $\alpha = .80$ for violence and neglect in the clinical patients.

The neglect and violence questionnaire also showed a good convergent validity with Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) in the clinical patients of the current dissertation. As indicated in Table 1, neglect was positively correlated with CTQ subscales including emotional and physical neglect, and also emotional and physical abuse. Also, perceived violence was positively correlated to physical neglect, and emotional and sexual abuse. There is a need to repeat these measurements in non-clinical samples, as many

factors, including Comorbidity of other psychiatric disorders and/or other substance abuse or dependence in clinical sample might have influenced participants' performance on some measures and produce inconsistent results (e.g., the relationship between violence and CTQ physical neglect in Table 1).

Table 1. *Bivariate Correlations of Perceived Neglect and Violence with CTQ subscales in Clinical Sample*

	1.	2.	3.	4.	5.	6.
<i>Perceived Neglect and Violence</i>						
1. Neglect						
2. Violence	.088					
<i>CTQ subscales</i>						
3. Emotional Neglect	.623**	.127				
4. Physical Neglect	.342**	.298**	.468**			
5. Emotional Abuse	.469**	.309**	.475**	.414**		
6. Physical Abuse	.479**	.192	.506**	.331**	.652**	
7. Sexual Abuse	.154	.426**	.277*	.244*	.412**	.388**

N = 100; ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

3.2.9. Demographic predictors

Demographic factors including age, sex, and ethnicity, education level, and marital status were obtained.

3.3. Procedure

After the study was approved by the Behavioural Research Ethics Board of UBC for the three groups, participants were recruited. All Questionnaires and tasks were programmed to be administered on a web-based platform (Remark Web Survey); thus participants could take part in the studies by browsing the website address that was provided for them. The

instructions were given on the computer screen preceding each questionnaire and task. Sessions were completed with researcher supervision for adolescents and clinical patients. University students completed the study on their own time without supervision.

After a short introduction and consent process, the implicit word associations and behavioural intentions tasks were first administered on the computer. Subsequently, participants filled out the Substance Use Risk Personality Scale, open-ended outcome expectancy measure, Self-coding of associations, Future orientation questionnaire, Perceived Stress Scale, neglect and violence measure, alcohol use level, AUDIT, and demographic information. The alcohol use level and AUDIT were assessed last, in order to avoid any interference between having to report their alcohol use and the measures of implicit and explicit alcohol-related cognitions. The implicit word associations task were administered before the open-ended outcome expectancy measure, because of possible carry-over effects which are stronger when the explicit test is administered first (Bosson, Swann, & Pennebaker, 2000).

In the Clinical sample, we had to change the order of the assessments, in that, the behavioural intentions task was moved to the end. This change was necessary, as the initial clinical participants refused to answer the questions and left the session at the beginning. Although the questions were not directly asking about substance use, participants found them very triggering for substance use, and because of the ethical issues, we moved them to the end; therefore, only those who were comfortable to answer these questions finished the assessments. Unfortunately, it left us with only 14 out of 100 participants who completed this section. Before leaving the assessment session, the research investigator debriefed all participants and asked them about any form of psychological distress, such as anxiety or

irritability they might have experienced during or after the session and provided them with all available options for further assistance. Staff onsite at BCMHA were always be there to provide assistance if patients seek additional support or counseling.

3.3.1. Adolescents

All students who fulfilled the inclusion criteria were invited to attend the study with a letter from their principal indicating that the school would be participating in a research study on risky behaviours. The nature of study materials and questions asked were specified in the letter. Parents were provided with an assent letter that informs them of the confidential use of the information. Study protocol was followed for parents who had concerns about the nature of the study. Students were provided with a similar detailed information letter and confirmed consent prior to starting the assessments. Identification of non-participants was not available to the school or other students. Students were recruited during regular school hours in an internet-enabled computer lab. All sessions were supervised by school personnel. A research investigator also attended the sessions to support delivery. Prior to the sessions, the school provided a list of student participants and the researcher investigator assigned a unique password to each. If the student agreed to the use of their data in research, then this password was used to access the survey. The total amount of time needed was approximately 1 hour for the assessment session. If participants did not wish to continue with the questionnaires or tasks in the middle of the assessment, they were free to leave the study at any time. They were also free not to answer any question or item they did not feel comfortable about it. These options were thoroughly explained in the consent form as well as before the start and during the session.

3.3.2. Undergraduate Students

An on-line consent was obtained using study website before the study procedure began. The consent explained that participation in this study is entirely voluntary, and at any time they may choose to withdraw from the study. Then they were tested using the SONA system in one session where they received 1.5 bonus percent for an assigned eligible psychology course. Students were asked to assign this credit to one of their eligible courses at the end of the study. SONA credit was assigned for those students enrolled in an “eligible” Psychology course. The total amount of time needed to complete the on-line session was between 45 and 90 minutes.

3.3.3. Clinical Patients

One of the staff in BCMHA who had access to the medical information of patients checked the patients for inclusion/exclusion criteria, and give a brief written description of the study to the eligible participants who were free to read it on their own time and/or with whomever he/she deemed necessary. The brief written description provided some basic information about the study, and asked them to contact that staff member or directly contact the research investigator by email or directly during working hours, if they were interested in participating. The research investigator then invited them to participate in the study. All participants signed the consent forms provided for them prior to their participation in the study. The consent form was provided to the participant, who was free to read the script on his/her own time or with whomever he/she deemed necessary. The consent form was also thoroughly explained by the research investigator. Once the research investigator reviewed the consent form with the participant, and the participant agreed to participate in the study, informed consent was obtained before the study procedures began. The research investigator explained

to each participant that participation in this study is entirely voluntary, and that they could choose to withdraw from the study at any time without losing the medical care they received. Participants were invited to attend one session with the research investigator, and to be tested individually in a private room at Burnaby Centre for Mental Health and Addiction (BCMHA) during the afternoon. The total amount of time needed was approximately 1 hour for the assessment session. The research investigator was present during the assessment sessions to ready the participant and material. This preparation included giving instructions, explaining study goals and procedures, answering questions, and supervising. Otherwise, there was no direct contact or communication between the participant and research investigator. An honorarium of \$10 was paid to participants upon completion the assessments.

3.4. Data Analysis

Summary scores were calculated for neglect and violence, and problematic alcohol use which were calculated using the AUDIT score. The four subscales of Substance Use Risk Profile Scale (SURPS), including Anxiety Sensitivity (AS), Negative Thinking (NT), Impulsivity (IMP), and Sensation Seeking (SS) by obtaining the mean of the response on relevant test items. The three subscales of Future Orientation Scale, including time perspective, planning ahead, and anticipation of future consequences were computed by taking the average of the relevant items for each subscale. The alcohol-related automatic associations and alcohol outcome expectancies were computed by summing all relevant items for each category. Score for Alcohol Outcome Expectancy Liking (AOEL) was calculated by taking the average of related items. Finally, perceived stress was computed by taking the average of all the items.

Preliminary analysis involved examining descriptive data for demographic information of three groups of participants. Bivariate correlations were then used to investigate the

relationship between variables. In the next step, we used multiple linear regression analyses to test hypotheses one to four. Following this, the INDIRECT method described by Preacher and Hayes (2008) was used to evaluate the mediation proposed in hypothesis five. Structural Equation Modeling (SEM) analysis using AMOS version 5 (Arbuckle, 2003) was conducted to test hypothesis six. Finally, to test sex differences (hypothesis seven), we first used Generalized Linear Model (GLzM) to compare the mean of variables between male and female participants, and then we assessed the interacting effect of sex and maltreatment on other variables using GLzM. The statistical methods are described in further details in chapter four before presenting results in each section.

In the current dissertation, I used a *planned comparison* approach for the data analysis. Instead of doing every possible comparison (multiple comparisons), I only focused on the scientifically sensible hypotheses based on the model explained in Chapter 2. The choice of comparisons was part of the experimental design of the dissertation which was presented and confirmed in the dissertation proposal before recruiting participants and accessing their data. Therefore, I did not do any more comparisons after looking at the data (post hoc). The advantage of doing planned comparison is that the statistical power of each comparison would be increased. This approach also addresses the shortcomings related to using classical strategies for dealing with the problem of multiple comparisons. The Bonferroni correction is one of the most common methods to the problem of multiple comparisons. The Bonferroni correction targets the problem with the Type 1 error and decreases the number of false rejections by adjusting the p value when several statistical tests are being performed simultaneously on a set of data based on the total number of dependent and independent tests being performed (i.e., multiple comparisons). Nonetheless, changing the p value, and

consequently, broadening the uncertainty intervals, increases the probability of not rejecting the null hypothesis when indeed it should have been (Type 2 error); therefore, it can extremely reduce the power. In addition, in situations that a researcher intends to maintain, and not to reject the null hypothesis, Bonferroni correction is not conservative (Gilman, Hill, Yajima, 2012; Perneger, 1998). To address these shortcomings, other methods have been suggested to decrease the familywise error rate without reducing the power.

One way to deal with this is using correction methods that consider the dependence across tests, such as permutation tests or bootstrapping methods (Westfall & Young, 1993). In preference to correcting for a supposed problem after doing the multiple comparisons, I built the relevant research questions and hypotheses of the dissertation based on a model from the beginning (planned comparison approach). I worked within a well-designed coherent model based on the previous literature in the field. Placing the burden of the analysis on a model that represents the relationships between the corresponding parameters, we did not need to be extremely concerned about the Type 1 error; as suggested by Gilman, Hill, and Yajima (2012), it is hardly possible that the null hypothesis be strictly true.

4. Chapter Four. Data Analysis

This chapter includes the analysis for the three groups of participants, including adolescents (n=145), undergraduate students (n=510), and clinical sample (n=100). In each section, I explain the analytical methods that I used to analyze the data and test the hypothesis, followed by the results for each group of participants.

4.1. Demographic Information

Demographic information of the three groups of participants is indicated in Table 2. The average age of three groups is 15, 20, and 37 years old, indicating that participants represent three different courses of life, including adolescence, young adulthood, and middle adulthood respectively. Almost equal males and females participated in the adolescent group, whereas, almost twice as many female undergraduate students participated than males in this group. In the clinical sample, the number of males was three times more than female participants. With regards to ethnicity, adolescents and clinical sample indicated similar distribution of Caucasian and Asian participants, whereas more First Nations participants were identified in clinical patients. Undergraduate students showed slightly different pattern with Caucasian as the more prevalent ethnicity (63%), followed by Asians (13%), while only 1% of participants were from First Nations ethnicity. Among adolescents, 46% were in grade 8, 11% in grade 9, 38% in grade 10, 3% in grade 11, and 2% in grade 12. In the clinical sample, the majority of participants' education level was from some high school with no diploma (40%), following by some college/university degrees (22%). In the clinical sample and undergraduate students, the majority of participants have never married/single (63% and 67%, respectively), whereas all participants in adolescents group had never married.

Table 2. *Demographic Information of Participants in Three Groups*

Variables		Adolescents (n=145)	Undergraduate Students (n=510)	Clinical Sample (n=100)
Age (years)	Age range	13-19	17-42	19-60
	Mean Age (SD) in Years	15 (1.22)	20 (2.44)	37 (11)
Sex (%)	Female	51	67	26
	Male	49	33	73
	Transgender	0	0	1
Ethnicity (%)	Caucasians	77	63	70
	First Nations	7	1	12
	Asians	6	13	4
	Other ^a	10	23	14
Education (%)	Grade 5 to 8	46	-	10
	High School-No Diploma	54	-	40
	Diploma	-	-	18
	College/university	-	100	22
	Graduate/Professional Studies	-	-	4
	Other	-	-	6
Marital status (%)	Single/Never Married	100	67	63
	Divorced/Separated/ Widowed	-	1	18
	Married/Common-Law Partnered/Partnered	-	31	15
	Other	-	2	4

N = 775; Note. a. Other Ethnicity consists of South Asian, Latin American, Middle Eastern, African, and choosing more than one ethnicity.

Table 3 indicates the mean and standard deviation of scores for neglect and violence, perceived stress, risky personality characteristics, system 1 and 2, and alcohol use in three groups of participants. As indicated, clinical patients received higher scores in neglect, violence, and perceived stress, compared to adolescents and undergraduate students who

showed similar scores in these variables. On average, participants of three groups received similar scores on risky personality characteristics, with some slight differences. With regards to system 1 processes, clinical patients received higher scores in all alcohol-related automatic associations, except for word associations score that was higher in undergraduate students. Besides, undergraduate students showed a noticeable higher score on these variables compared to adolescents.

Clinical patients received higher scores in alcohol outcome expectancy liking compared to other two groups, whereas this score was negative in adolescents. Except for alcohol dealing with difficulties expectancy, undergraduate students received higher scores on other alcohol outcome expectancy categories, than clinical patients. Three groups were slightly different in future orientation total score and its subscales, with undergraduate students showed negligibly better scores.

Undergraduate students reported more recent and higher quantity of alcohol use, compared to other groups, whereas clinical patients received higher score on frequency of alcohol use. In addition, AUDIT scores for the clinical patients were much higher than for the other two groups, particularly adolescents.

Table 3. *Descriptive Statistics for Maltreatment, Perceived Stress, Risky Personality Characteristics, System 1 and 2 Processes, and Alcohol Use in Three Groups*

	Adolescents (n=145)	Undergraduate Students (n=510)	Clinical Sample (n=100)
Maltreatment	M (SD)	M (SD)	M (SD)
Neglect	12.69 (4.58)	10.79 (3.88)	15.69 (5.05)
Violence	14.14 (4.54)	12.62 (4.23)	18.29 (4.40)
Perceived Stress	1.68 (.71)	1.88 (.61)	2.14 (.69)
Risky Personality Characteristics			
Anxiety Sensitivity	2.93 (.79)	3.15 (.69)	3.10 (.73)
Negative Thinking	2.19 (.74)	2.30 (.51)	2.53 (.82)
Impulsivity	2.72 (.73)	2.45 (.66)	2.96 (.67)

Sensation Seeking	3.29 (.89)	3.36 (.77)	3.20 (.78)
System 1 Processes			
<i>Alcohol Automatic Associations</i>			
Word	1.13 (1.37)	3.04 (2.19)	2.18 (1.95)
Sex	-	.18 (.49)	.64 (1.01)
Celebrate	.57 (1.04)	1.40 (1.37)	1.43 (1.45)
Social	.17 (.54)	.63 (1.01)	1.07 (1.27)
Coping	.19 (.75)	.34 (.85)	2.50 (3.01)
System 2 Processes			
<i>Alcohol Outcome Expectancies*</i>			
Outcome expectancy liking	-.38 (1.18)	.29 (1.03)	.66 (1.37)
Letting go	1.43 (1.11) ^a	1.87 (1.32)	1.31 (1.43)
Dealing with difficulties	.55 (.94) ^b	.74 (1.03)	.98 (1.24)
Enjoying things	1.59 (1.38) ^c	2.05 (1.27)	1.31 (1.37)
Impairment	1.16 (1.28) ^d	1.38 (1.19)	1.26 (1.38)
Enhancing experience		1.22 (1.25)	.89 (1.24)
Future Orientation Total	2.71 (.34)	2.84 (.33)	2.57 (.34)
Planning Ahead	2.63 (.51)	2.87 (.48)	2.52 (.51)
Time Perspective	2.68 (.45)	2.74 (.41)	2.55 (.51)
Anticipation of Future Consequences	2.81 (.45)	2.91 (.43)	2.65 (.44)
Alcohol Use			
Recency of Alcohol Use	2.78 (1.49)	4.17 (1.15)	3.16 (1.08)
Frequency of Alcohol Use	2.32 (4.00)	4.69 (4.87)	5.34 (10.21)
Quantity of Alcohol Use	2.23 (3.10)	3.36 (3.11)	2.20 (3.86)
Problematic Alcohol Use (AUDIT)	8.63 (7.12)	12.29 (7.05)	19.70 (12.85)

N= 775; Note. *Different self-coding categories of alcohol outcome expectancies were used for adolescents. a. Feeling Good, b. Feeling Better, c. Feeling Bad, d. Feeling Worse

4.2. Bivariate Correlations

Table 4, 5, 6, 7, 8 and 9 indicate the bivariate correlations among perceived neglect and violence, perceived stress, risky personality characteristics (Tables 4, 6, and 8), system 1 processes, system 2 processes (Tables 5, 7, and 9), and alcohol use (included in all Tables 4-9). Each pair of tables shows the relationship between the set of variables and alcohol use for adolescents (Tables 4 and 5), undergraduate students (Tables 6 and 7), and the clinical patients

(Tables 8 and 9), respectively. Tables 4, 6, and 8 are the same variables, as are tables 5, 7, and 8. They differ in the predictor variables included and also overlap in the alcohol use variables.

Table 4 and 5 indicate the bivariate correlations in the adolescents' group. Neglect and violence were highly correlated with each other, indicating those with higher levels of neglect were also likely to experience violence as well; however, only perceived violence was associated with more recent alcohol use and higher problematic alcohol use (AUDIT score) in this group. Also, neglect was related to the frequency of alcohol use. All measures of alcohol use were positively and strongly related to each other.

As indicated in Table 4, both neglect and violence were related to higher perceived stress in the past month. Perceived neglect showed a negative relationship with anxiety sensitivity and a positive relationship with negative thinking, whereas perceived violence was positively correlated with negative thinking, impulsivity, and sensation seeking. Except for the relationship between neglect and time perspective, total future orientation and its subscale were negatively correlated with neglect and violence.

Perceived stress was not related to any measures of alcohol use. Two risky personality characteristics, sensation seeking and impulsivity, were positively related to recency of alcohol use, and problematic alcohol use, whereas anxiety sensitivity was negatively related to both these measures of alcohol use. Only sensation seeking was positively related to the quantity of alcohol use (number of drinks per occasion). Both neglect and violence were associated with higher levels of negative thinking, but negative thinking was not related to any measure of alcohol use. With regards to system 2 processes, total score of future orientation was negatively correlated to both recent and problematic alcohol use. Only recency of alcohol use was negatively associated with two subscales of future orientation, including planning

ahead, and anticipation of future orientation. Surprisingly, frequency of drinking in the past month showed a positive correlation with future orientation time perspective.

Table 4. *Bivariate Correlations of Maltreatment and Alcohol Use for Perceived Stress, Risky Personality Characteristics, and Future Orientation in Adolescents*

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Violence														
2. Neglect	.375**													
3. Perceived Stress	.439**	.351**												
4. Anxiety Sensitivity	-.116	-.168*	.047											
5. Negative Thinking	.257**	.497**	.536**	-.042										
6. Impulsivity	.423**	.113	.278**	-.181*	.118									
7. Sensation Seeking	.263**	-.108	.029	-.299**	-.277**	.260**								
8. Future Orientation Total	-.265**	-.354**	-.264**	.407**	-.321**	-.489**	-.124							
9. Planning Ahead	-.272**	-.380**	-.241**	.351**	-.168	-.401**	-.236**	.772**						
10. Time Perspective	-.193*	-.151	-.208*	.275**	-.278**	-.252**	-.054	.751**	.384**					
11. Anticipation of Future Consequences	-.227**	-.266**	-.165	.299**	-.197*	-.434**	-.079	.715**	.299**	.364**				
<i>Measures of Alcohol Use</i>														
12. Recency	.312**	.142	.132	-.241**	.024	.303**	.530**	-.212*	-.274**	-.092	-.189*			
13. Frequency	.116	.327**	-.034	-.182	.007	.197	-.029	-.043	-.106	.116	-.086	.436**		
14. Quantity	.109	.123	.075	-.147	.032	.121	.230*	-.018	-.065	.012	-.029	.495**	.241*	
15. AUDIT	.216*	.124	.028	-.204*	-.042	.214*	.212*	-.222*	-.187	-.160	-.175	.435**	.494**	.461**

** . Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

Table 5 indicates the bivariate correlations among perceived maltreatment, alcohol outcome expectancies, alcohol memory associations, and alcohol use in adolescents. With regards to maltreatment, only feeling good expectancy was significantly correlated with perceived violence, however, the pattern was rather different for measures of alcohol use. Among system 2 processes (alcohol outcome expectancies), alcohol outcome expectancy liking was positively related to all measures of alcohol use. Feeling good expectancy was correlated with more recent and higher problematic alcohol use, whereas only feeling better expectancy was related to higher recency and frequency of alcohol use. Both feeling bad and worse outcome expectancies were negatively correlated with recent and problematic alcohol use. With regards to system 1 processes, the relationship between maltreatment and alcohol automatic associations was not significant. Recency of alcohol use was positively related to all alcohol associations (word, celebrate, social, and coping), whereas frequency of alcohol use, and problematic alcohol use were related to all alcohol associations, except alcohol word associations. In addition, the quantity of alcohol use was positively related to the word and celebrate alcohol associations.

Table 5. *Bivariate Correlations of Maltreatment and Alcohol Use for Alcohol Automatic Associations and Alcohol Outcome Expectancies in Adolescents*

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Violence														
2. Neglect	.375**													
<i>Alcohol Automatic Associations</i>														
3. Word	.084	.113												
4. Celebrate	.081	.152	.449**											
5. Social	-.010	.066	.320**	.597**										
6. Coping	.051	.118	.189*	.489**	.551**									
<i>Alcohol Outcome Expectancy</i>														
7. AOE liking	.149	.124	.163	.339**	.239**	.315**								
8. Feeling Good	.234**	.088	.176*	.274**	.275**	.243**	.392**							
9. Feeling Better	.053	.034	.053	.094	.056	.085	.476**	.054						
10. Feeling Bad	-.131	-.055	-.064	-.122	-.073	-.071	-.473**	-.070	-.265**					
11. Feeling Worse	-.146	-.055	-.123	-.140	-.087	-.126	-.473**	-.460**	-.144	-.066				
<i>Measures of Alcohol Use</i>														
12. Recency	.312**	.142	.458**	.510**	.336**	.188*	.449**	.377**	.199*	-.251**	-.259**			
13. Frequency	.116	.327**	.040	.269*	.263*	.313**	.238*	.113	.271*	-.075	.043	.436**		
14. Quantity	.109	.123	.250*	.395**	.217	.105	.278*	.148	.049	-.046	-.235*	.495**	.241*	
15. AUDIT	.216*	.124	.015	.481**	.254*	.466**	.517**	.289**	.143	-.203*	-.323**	.435**	.494**	.461**

** . Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

Table 6 and 7 indicate the bivariate correlations in undergraduate students group. Again, neglect and violence were highly correlated with each other, indicating neglect ones were more likely to experience violence as well, however, only perceived violence was associated with higher levels of frequency of alcohol use, and problematic alcohol use (AUDIT score). Neglect was not related to any measure of alcohol use in undergraduate students. Again, all measures of alcohol use were positively and strongly related to each other.

As indicated in Table 6, both perceived neglect and violence were related to higher levels of perceived stress, negative thinking, and impulsivity. Also, the relationship between maltreatment and sensation seeking was significant, in that violence and sensation seeking showed a positive relationship, whereas this relationship was negative between neglect and sensation seeking. Both perceived neglect and violence were negatively related to total future orientation and its subscale, except for the relationship between violence and time perspective which was not significant.

With regards to measure of alcohol use, perceived stress was only related to problematic alcohol use. Among risky personality characteristics, sensation seeking and impulsivity were positively related to recency, and problematic alcohol use, whereas anxiety sensitivity was negatively related to quantity of alcohol use. Frequency of alcohol use was positively correlated with sensation seeking. With regards to system 2 processes, the total future orientation and its subscale were significantly related to the problematic alcohol use, in that lower scores in future orientation and its subscales were associated with higher score of AUDIT. The frequency of alcohol use in the past month was negatively related to the total future orientation and its subscale. In addition, recency of alcohol use was negatively related to total future orientation and its subscale, planning ahead.

Table 6. *Bivariate Correlations of Maltreatment and Alcohol Use for Perceived Stress, Risky Personality Characteristics, and Future Orientation in Undergraduate Students*

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Violence														
2. Neglect	.432**													
3. Perceived Stress	.163**	.243**												
4. Anxiety Sensitivity	.035	.006	.298**											
5. Negative Thinking	.236**	.524**	.422**	.050										
6. Impulsivity	.315**	.282**	.242**	-.032	.137**									
7. Sensation Seeking	.098*	-.114*	-.120**	-.278**	-.211**	.244**								
8. Future Orientation Total	-.176**	-.234**	-.065	.209**	-.221**	-.463**	-.168**							
9. Planning Ahead	-.129**	-.153**	.064	.186**	-.110*	-.359**	-.266**	.788**						
10. Time Perspective	-.063	-.166**	-.079	.133**	-.120**	-.227**	-.014	.687**	.283**					
11. Anticipation of Future Consequences	-.181**	-.240**	-.139**	.143**	-.267**	-.466**	-.099*	.780**	.443**	.326**				
<i>Measures of Alcohol Use</i>														
12. Recency	.029	-.015	.080	.043	-.075	.130**	.213**	-.111*	-.141**	-.026	-.077			
13. Frequency	.115*	.025	.045	-.028	-.010	.085	.190**	-.182**	-.147**	-.164**	-.102*	.402**		
14. Quantity	.090	.025	-.009	-.133**	-.043	.146**	.270**	-.077	-.083	-.022	-.085	.399**	.151**	
15. AUDIT	.089*	.060	.102*	-.077	-.004	.270**	.356**	-.245**	-.234**	-.134**	-.192**	.622**	.453**	.591**

** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

Table 7 indicates the bivariate correlations among perceived maltreatment, alcohol outcome expectancies, alcohol automatic associations, and alcohol use in undergraduate students. With regards to alcohol outcome expectancies, history of both neglect and violence was related to dealing with difficulties expectancy. All measures of alcohol use were positively related to alcohol outcome expectancy liking and alcohol enjoying things expectancy, and negatively to alcohol impairment expectancy. In addition, alcohol enhancing experiences and letting go expectancies were positively correlated to recency and quantity of use, and problematic alcohol use. Alcohol enhancing experiences expectancy was also positively related to frequency of use. Only the relationship between alcohol dealing with difficulties expectancy and problematic alcohol use was positively significant. Among system 1 processes, perceived violence was positively correlated with alcohol coping associations. All alcohol associations (word, sex, celebrate, social, and coping) were significantly and positively associated with all measures of alcohol use.

Table 7. *Bivariate Correlations of Maltreatment and Alcohol Use for Alcohol Automatic Associations and Alcohol Outcome Expectancies in Undergraduate Students*

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Violence																
2. Neglect	.432**															
<i>Alcohol Automatic Associations</i>																
3. Word	.055	-.077														
4. Sex	-.004	.000	.222**													
5. Celebrate	.015	-.039	.419**	.356**												
6. Social	.005	-.013	.293**	.487**	.509**											
7. Coping	.109*	.091*	.286**	.334**	.302**	.407**										
<i>Alcohol Outcome Expectancy</i>																
8. AOE liking	-.025	-.015	.228**	.160**	.300**	.174**	.105*									
9. Letting Go	-.084	-.044	.152**	.101*	.259**	.137**	.049	.367**								
10. Dealing with Difficulties	.171**	.130**	.115**	.058	.074	.080	.182**	.039	.118**							
11. Enjoying Things	.008	-.083	.222**	.124**	.328**	.134**	.047	.646**	.387**	-.039						
12. Impairment	-.062	-.083	-.076	-.029	-.084	.012	-.016	-.519**	-.209**	-.032	-.413**					
13. Enhancing Experience	.018	-.073	.247**	.145**	.325**	.217**	.086	.416**	.474**	.119**	.458**	-.178**				
<i>Measures of Alcohol Use</i>																
14. Recency	.029	-.015	.302**	.205**	.424**	.282**	.216**	.304**	.212**	.060	.249**	-.143**	.213**			
15. Frequency	.115*	.025	.130**	.121**	.288**	.241**	.218**	.186**	.058	.046	.164**	-.091*	.145**	.402**		
16. Quantity	.090	.025	.217**	.141**	.360**	.210**	.120*	.216**	.186**	.011	.199**	-.102*	.221**	.399**	.151**	
17. AUDIT	.089*	.060	.352**	.275**	.553**	.406**	.291**	.348**	.232**	.109*	.278**	-.137**	.315**	.622**	.453**	.591**

** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

Table 8 and 9 indicate the bivariate correlations in clinical sample. Neglect and violence were not correlated with each other in this sample. Also, perceived maltreatment was not associated with any measure of alcohol use. All measures of alcohol use were positively and significantly correlated with each other.

As Table 8 shows, perceived neglect was correlated with higher current perceived stress and negative thinking, whereas perceived violence was associated with higher negative thinking and impulsivity. Only neglect had a negative correlation with one of the future orientation subscales which was anticipation of future consequences. With regards to measure of alcohol use, problematic alcohol use was positively correlated to the perceived stress in the past month, anxiety sensitivity, and negative thinking. In addition, recency of use was positively correlated to sensation seeking. No significant relationship was found between measures of alcohol use and future orientation.

Table 8. *Bivariate Correlations of Maltreatment and Alcohol Use for Perceived Stress, Risky Personality Characteristics, and Future Orientation in Clinical Sample*

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Violence														
2. Neglect	.088													
3. Perceived Stress	.136	.291**												
4. Anxiety Sensitivity	-.053	-.073	.107											
5. Negative Thinking	.256*	.214*	.495**	-.057										
6. Impulsivity	.235*	.075	.242*	.156	.278**									
7. Sensation Seeking	-.102	-.154	-.066	-.012	-.034	.034								
8. Future Orientation Total	-.140	-.069	-.276*	.018	-.431**	-.388**	-.043							
9. Planning Ahead	-.005	-.006	-.209	.175	-.293**	-.209	-.143	.752**						
10. Time Perspective	-.036	.030	-.071	.032	-.280**	-.210*	.093	.673**	.209					
11. Anticipation of Future Consequences	-.266*	-.060	-.083	-.177	-.247*	-.434**	.024	.658**	.313**	.156				
<i>Measures of Alcohol Use</i>														
12. Recency	-.017	.059	.075	.125	.149	.072	.206*	-.075	-.027	-.201	.059			
13. Frequency	.105	.060	.051	.084	.059	.121	-.214	-.135	-.046	-.104	-.202	.353**		
14. Quantity	-.017	.051	.093	.145	.137	.050	.029	-.016	.048	-.062	-.049	.527**	.417**	
15. AUDIT	.155	.173	.320**	.238*	.313**	.174	-.077	-.184	-.067	-.116	-.175	.353**	.522**	.419**

** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

Table 9 indicates the bivariate correlations among perceived maltreatment, alcohol outcome expectancies, alcohol automatic associations, and alcohol use in the clinical sample. With regards to alcohol outcome expectancies, only history of violence was significantly related to dealing with difficulties expectancy. Also, recency of alcohol use was positively related to alcohol enjoying things and enhancing experiences expectancy.

Among system 1 processes, perceived violence was positively correlated to sex, celebrate, and social alcohol associations. Among measures of alcohol use, problematic alcohol use was positively correlated to celebrate, social, and coping associations, whereas recency of use was related to word associations and frequency of use was correlated to sex associations. However, because of the small number of participants ($n=14$) who completed questions related to alcohol sex, celebrate, social, and coping associations, results related to these variables are relevant only to a small subset of the clinical sample. The significance of these findings, despite the small number of participants who completed them and the initial strong trigger reaction to these measures, point to the potential importance of these measures.

Table 9. *Bivariate Correlations of Maltreatment and Alcohol Use for Alcohol Automatic Associations and Alcohol Outcome Expectancies in Clinical Sample*

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Violence																
2. Neglect	.088															
<i>Alcohol Automatic Associations</i>																
3. Word	-.080	-.088														
4. Sex	.780**	-.330	.332													
5. Celebrate	.629*	-.055	.633*	.585*												
6. Social	.678**	-.124	.494	.743**	.900**											
7. Coping	.447	.006	.431	.622*	.722**	.837**										
<i>Alcohol Outcome Expectancy</i>																
8. AOE liking	.090	-.171	.112	-.018	.276	.299	.326									
9. Letting Go	.111	.190	.234*	.118	.308	.398	.440	-.100								
10. Dealing with Difficulties	.243*	.049	.271**	.447	.180	.290	.667**	-.034	.114							
11. Enjoying Things	.000	.019	.301**	-.153	.190	.186	.246	.191	.192	.041						
12. Impairment	.041	.076	.331**	.151	.154	.173	.165	-.391**	.064	.081	.056					
13. Enhancing Experience	.038	-.005	.281**	.082	.291	.261	.405	.284*	.268**	.097	.405**	.119				
<i>Measures of Alcohol Use</i>																
14. Recency	-.017	.059	.211*	.000	.055	.000	.293	.197	.048	.107	.244*	.151	.320**			
15. Frequency	.105	.060	.040	.669*	.299	.425	.360	.119	-.100	-.099	-.089	.007	-.025	.353**		
16. Quantity	-.017	.051	.011	.200	.166	.116	.460	.115	.033	-.070	.199	-.139	.143	.527**	.419**	
17. AUDIT	.155	.173	.026	.458	.574*	.642*	.832**	.002	.177	.089	.125	.092	.124	.353**	.522**	.298**

** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

4.3. Analysis for Hypotheses

4.3.1. Analysis for Hypothesis 1

First, I hypothesized that perceived maltreatment is associated with impairment in system 2 processes. Particularly, I hypothesized that those with maltreatment histories would indicate lower future orientation. I also hypothesized that they would expect more positive and coping effects from drinking alcohol. I used linear regression analysis to examine the relationship between multiple forms of maltreatment and system 2 processes. Separate regression models were conducted for each dependent variable (system 2 processes), where neglect and violence were entered simultaneously. Results are listed in Table 10, 11, and 12 for adolescents, undergraduate students, and clinical sample, respectively.

Results of the regression analysis in adolescents' group are indicated in Table 10. Perceived neglect was significantly associated with lower scores of total future orientation ($F(2, 131) = 11.15, p < .001$) and two of the subscales, including planning ahead ($F(2, 134) = 13.07, p < .001$) and anticipation of future consequences ($F(2, 135) = 6.62, p < .01$). In addition, the relationship between violence and alcohol feeling good was significant ($F(2, 138) = 4.00, p < .05$).

Table 10. *Regression Coefficients for Predicting System 2 processes From Maltreatment in Adolescents*

Maltreatments	Violence		Neglect		R ²
	B (SE)	β	B (SE)	β	
Alcohol Outcome Expectancies					
Outcome expectancy liking	.03 (.02)	.12	.02 (.02)	.08	.028
Feeling good	.06 (.02)	.23**	.001 (.02)	.00	.055
Feeling better	.01 (.02)	.05	.003 (.02)	.02	.003
Feeling bad	-.04 (.03)	-.13	-.002 (.03)	-.01	.017
Feeling worse	-.04 (.03)	-.15	.00 (.03)	.00	.021
Future Orientation Total	-.01 (.01)	-.15	-.02 (.01)	-.30***	.145

Planning Ahead	-.02 (.01)	-.15	-.04 (.01)	-.32***	.163
Time Perspective	-.02 (.01)	-.16	-.01 (.01)	-.09	.044
Anticipation of Future Consequences	-.01 (.01)	-.15	-.02 (.01)	-.21*	.089

* $P < .05$, ** $P < .01$, *** $P < .001$

Results of the regression analysis in undergraduate students group are indicated in Table 11. Perceived maltreatment subscales was significantly associated with lower total future orientation and anticipation of future consequences ($F(2, 485) = 15.20, p < .001$, $F(2, 498) = 17.26, p < .001$, respectively). However, these relationships were stronger for neglect. Also, neglect was significantly correlated with lower time perspective and planning ahead ($F(2, 500) = 7.07, p < .001$, $F(2, 499) = 7.28, p < .001$, respectively). In addition, the relationship between violence and alcohol dealing with difficulties expectancy was significant ($F(2, 507) = 8.69, p < .001$), in that those with higher levels of violence were more likely to drink alcohol to deal with difficult things. Also, the relationship between neglect and alcohol enjoying things expectancy and alcohol enhancing experience were negatively significant showing that neglected individuals expected less enjoyment and enhancement of experiences from drinking alcohol, however these models were not significant ($F(2, 507) = 2.34, p = .10$; $F(2, 507) = 2.15, p = .12$, respectively).

Table 11. *Regression Coefficients for Predicting System 2 processes From Maltreatment in Undergraduate Students*

Maltreatments	Violence		Neglect		R ²
	B (SE)	β	B (SE)	β	
Alcohol Outcome Expectancies					
Outcome expectancy liking	-.01 (.01)	-.02	-.001 (.01)	-.01	.001
Letting go	-.03 (.02)	-.08	-.003 (.02)	-.01	.007
Dealing with difficulties	.03 (.01)	.14**	.02 (.01)	.07	.033
Enjoying things	.02 (.02)	.05	-.04 (.02)	-.11*	.009
Impairment	-.01 (.01)	-.03	-.02 (.02)	-.07	.008

Enhancing experience	.02 (.01)	.06	-.03 (.02)	-.10*	.008
Future Orientation Total	-.01 (.004)	-.09*	-.02 (.004)	-.20***	.062
Planning Ahead	-.01 (.01)	-.08	-.02 (.01)	-.12*	.028
Time Perspective	.001 (.01)	.01	-.02 (.01)	-.17***	.028
Anticipation of Future Consequences	-.01 (.01)	-.10*	-.02 (.01)	-.20***	.065

* $P < .05$, ** $P < .01$, *** $P < .001$

Table 12 shows the results of testing the hypothesis 1 in clinical patients. As it is indicated, perceived violence had a negative effect on the anticipation of future consequences ($F(2, 85) = 3.27, p < .05$). The relationship between violence and alcohol dealing with difficulties expectancy was also significant ($F(2, 95) = 3.01, p < .05$). Other relationships were not significant.

Table 12. *Regression Coefficients for Predicting System 2 Processes From Maltreatment in Clinical Sample*

Maltreatments	Violence		Neglect		R2
	B (SE)	β	B (SE)	β	
Alcohol Outcome Expectancy					
Outcome expectancy liking	.03 (.04)	.11	-.05 (.04)	-.18	.041
Letting go	.03 (.03)	.10	.05 (.03)	.18	.045
Dealing with difficulties	.07 (.03)	.24*	.01 (.03)	.03	.060
Enjoying things	-.001 (.03)	-.02	.05 (.03)	.02	.000
Impairment	.01 (.03)	.04	.02 (.03)	.07	.007
Enhancing experience	.01 (.03)	.04	-.002 (.03)	-.01	.001
Future Orientation Total	-.01 (.01)	-.13	-.003 (.01)	-.05	.022
Planning Ahead	.00 (.01)	-.004	-.001 (.01)	-.01	.000
Time Perspective	-.01 (.01)	-.04	.004 (.01)	.04	.002
Anticipation of Future Consequences	-.03 (.01)	-.26*	-.002 (.01)	-.02	.072

* $P < .05$

4.3.2. Analysis for Hypothesis 2

Second hypothesis explored the relationship between perceived maltreatment (neglect and violence) and system 1 processes (automatic memory associations). It was hypothesized that maltreated individuals would reveal more coping alcohol-related associations. Results are indicated in Table 13 for adolescents, undergraduate students, and clinical sample.

In adolescents, no significant relationship was found between perceived neglect and violence and automatic memory association. For undergraduate students, both neglect and violence were associated with alcohol word associations ($F(2, 507) = 4.04, p < .05$), in that higher perceived violence was related to more and neglect was correlated with less alcohol word associations. In addition, the model predicting the effect of maltreatment on alcohol coping associations was significant ($F(2, 507) = 3.66, p < .05$). In the clinical sample group, the model predicting the effect of maltreatment on alcohol sex associations indicated a positive correlation with violence, and a negative correlation with neglect ($F(2, 11) = 16.21, p < .001$). Also, violence was positively correlated with alcohol social ($F(2, 11) = 5.18, p < .05$). As mentioned before, because of the small number of participants ($n=14$) who completed questions related to alcohol sex, celebrate, social, and coping associations, results related to this variables are relevant only to a small subset of the clinical sample.

Table 13. *Regression Coefficients for Predicting System 1 Processes From Maltreatment in Three Groups of Participants*

Maltreatments	Violence		Neglect		
	B (SE)	β	B (SE)	β	R^2
Adolescents (n=145)					
<i>Alcohol Automatic Association</i>					
Word	.01 (.03)	.04	.03 (.03)	.09	.014
Celebrate	.003 (.02)	.02	.03 (.02)	.15	.023
Social	-.01 (.01)	-.05	.01 (.01)	.09	.006

Coping	.00 (.02)	-.003	.02 (.02)	.12	.014
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Undergraduate Students (n= 510)

Alcohol Automatic Association

Word	.06 (.03)	.11*	-.07 (.03)	.13*	.016
Sex	-.001 (.01)	-.01	.00 (.01)	.002	.000
Celebrate	.01 (.02)	.04	-.02 (.02)	-.06	.003
Social	.003 (.01)	.01	-.01 (.01)	-.02	.000
Coping	.02 (.01)	.09	.01 (.01)	.05	.014

Clinical Sample (n= 100)

Alcohol Automatic Associations

Word	-.03 (.05)	-.07	-.03 (.04)	-.08	.013
Sex ^a	.22 (.04)	.80***	-.08 (.03)	-.37*	.747
Celebrate ^a	.25 (.09)	.63*	-.03 (.08)	-.09	.404
Social ^a	.23 (.07)	.69**	-.05 (.06)	-.16	.485
Coping ^a	.36 (.22)	.45	-.01 (.18)	-.02	.200

* $P < .05$, ** $P < .01$, *** $P < .001$; a. Results for alcohol sex, celebrate, social, and coping associations are based on 14 participants

4.3.3. Analysis for Hypothesis 3

Hypothesis 3 involved testing the relationship between perceived maltreatment (neglect and violence) and current perceived stress. It was hypothesized that the perceived neglect and violence is associated with higher levels of current perceived stress. Results for the three groups are shown in Table 14. As the result from linear regression model indicated, both perceived violence and neglect were associated with higher levels of perceived stress in the past month in both adolescents and undergraduate students ($F(2, 138) = 20.33, p < .001$; and $F(2, 485) = 16.35, p < .001$, respectively). However, in the clinical sample, only perceived neglect increased the risk of current perceived stress ($F(2, 77) = 3.85, p < .05$).

Table 14. *Regression Coefficients for Predicting Perceived Stress From Maltreatment in Three Groups of Participants*

Maltreatments	Violence		Neglect		R ²
	B (SE)	β	B (SE)	β	
Adolescents (n=140)					
Perceived Stress	.06 (.01)	.36***	.03 (.01)	.22**	.233
Undergraduate Students (n= 487)					
Perceived Stress	.01 (.01)	.07*	.03 (.01)	.21***	.063
Clinical Sample (n= 78)					
Perceived Stress	.01 (.02)	.08	.04 (.02)	.28*	.091

* $P < .05$, ** $P < .01$, *** $P < .01$

4.3.4. Analysis for Hypothesis 4

Hypothesis 4 examined the relationship between perceived maltreatment (neglect and violence) and risky personality characteristics. It was hypothesized that maltreatment is associated with risky personality characteristics, specifically higher levels of impulsivity. To explore these relationships, separate linear regression models were used, where neglect and violence entered simultaneously. As indicated in Table 15, in all three groups, perceived neglect was associated with higher levels of negative thinking ($F(2, 138) = 23.45, p < .001$; $F(2, 507) = 95.82, p < .001$; and $F(2, 95) = 5.43, p < .01$, for adolescents, undergraduate students and clinical patients, respectively), whereas the relationship between violence and negative thinking was only significant in clinical sample. In addition, those exposed to violence were more likely to report higher levels of impulsivity in all three groups ($F(2, 138) = 15.31, p < .001$; $F(2, 507) = 36.34, p < .001$; and $F(2, 95) = 2.93, p = .06$, for adolescents, undergraduate students and clinical patients, respectively), whereas the relationship between neglect and impulsivity was only significant in undergraduate students. Similar results were observed in models that tested the effect of maltreatment on sensation seeking in adolescents

and undergraduate students, in that perceived violence was related to a higher level of sensation seeking, and perceived neglect was related to a lower level of sensation seeking ($F(2, 138) = 9.29, p < .001$; and $F(2, 507) = 10.44, p < .001$, for adolescents and undergraduate students, respectively).

Table 15. *Regression Coefficients for Predicting Risky Personality Characteristics From Maltreatment in Three Groups of Participants*

Maltreatments	Violence		Neglect		R ²
	B (SE)	β	B (SE)	β	
Adolescents (n=141)					
Anxiety Sensitivity	-.01 (.02)	-.06	-.03 (.02)	-.15	.032
Negative Thinking	.01 (.01)	.08	.08 (.01)	.47***	.253
Impulsivity	.07 (.01)	.44***	-.01 (.01)	-.05	.182
Sensation Seeking	.07 (.02)	.35***	-.05 (.02)	-.40**	.119
Undergraduate Students (n= 509)					
Anxiety Sensitivity	.01 (.01)	.04	-.002 (.01)	-.01	.001
Negative Thinking	.001 (.01)	.01	.07 (.01)	.52***	.274
Impulsivity	.04 (.01)	.24***	.03 (.01)	.18***	.125
Sensation Seeking	.03 (.01)	.18***	-.04 (.01)	-.19***	.040
Clinical Sample (n= 97)					
Anxiety Sensitivity	-.01 (.02)	-.05	-.01 (.02)	-.07	.007
Negative Thinking	.04 (.02)	.24*	.03 (.02)	.19*	.103
Impulsivity	.04 (.02)	.23*	.01 (.01)	.06	.058
Sensation Seeking	-.02 (.02)	-.09	.22 (.02)	.15	.031

* $P < .05$, ** $P < .01$, *** $P < .001$

4.3.5. Analysis for Hypothesis 5

To examine the hypothesis that system 1 and system 2 processes, current perceived stress, and risky personality characteristics mediate the relationship between perceived maltreatment (neglect and violence) and alcohol use, I used INDIRECT (Preacher & Hayes, 2008). INDIRECT is the macro developed by Preacher and Hayes (2008) for SPSS and is available at Andrew Hayes' webpage, <http://afhayes.com/spss-sas-and-mplus-macros-and-code.html>. This macro computes the indirect effect of one variable (independent variable) on

another variable (dependent variable) through the mediator(s). This macro computes the indirect effect of each mediator controlling for other mediators and also the combined mediating effect (i.e., Total). I also used the bootstrapping method offered by this macro to ensure normality, particularly in the total indirect effects. This technique involves resampling from the original dataset and assessing the indirect effect in an approximating distribution. As recommended by Preacher and Hayes (2008), I resampled 5000 times.

I did not conduct any indirect analysis for the clinical sample, as previous results did not show any significant relationships between maltreatment (neglect and violence) and measures of alcohol use in this sample. No shared significant variables were found between neglect and frequency of alcohol use in adolescents; therefore, I did not conduct any indirect analysis for this relationship. In addition, there was no significant relationship between neglect and any other measure of alcohol use in adolescents and undergraduate students; thus only violence was entered as independent variable in indirect models. In the adolescents group, violence was correlated to both recency of alcohol use and problematic alcohol use (AUDIT). Mediation analyses were conducted in which violence was entered as the independent variable and recency of alcohol use and problematic alcohol use (AUDIT) were separately entered as the dependent variable. System 2 processes and risky personality characteristics were separately considered as the mediators for each analysis. In each indirect model, only variables were entered as mediators that were significantly correlated with both the independent variable (violence) and dependent variable (Recency & AUDIT).

Table 16 and 17 indicate the point estimates (beta coefficients), standard errors, and Z-scores for the individual and total mediation effects in adolescents. Also the Bias Corrected (BC) bootstrap CI of 95% confidence intervals for the individual and total indirect effects is

presented. With regards to the mediation of system 2, only alcohol feeling good expectancy emerged as a significant mediator in the relationship between violence and recency of alcohol use (Model A1; $F(3, 128) = 10.06, p < .001$; Table 16). In relation to risky personality characteristics, both sensation seeking and impulsivity significantly mediated the relationship between violence and recency of alcohol use (Model A2; $F(3, 134) = 21.72, p < .001$).

Table 16. *Multiple Mediator Analyses Examining Indirect Effects of Violence on Recency of Alcohol Use Through System 1 and 2 processes, and Risky Personality Characteristics in Adolescents*

Models	Point Estimate	Product of Coefficients		Bootstrapping 95% CI	
		SE	Z	Lower	Upper
Model A1, n = 132					
M = System 2 Processes					
DV = Recency of Alcohol Use ^a					
Alcohol Feeling Good Expectancy (FGE)	.0216*	.0103	2.0916	.0060	.0461
Future Orientation (FO)	.0087	.0074	1.1827	-.0031	.0291
Total	.0304*	.0126	2.4183	.0095	.0586
FGE vs. FO	.0129	.0129	1.0022	-.0104	.0431
Model A2, n = 138					
IV = Risky Personality Characteristics					
DV = Recency of Alcohol Use					
Sensation Seeking (SS)	.0387*	.0389	.0002	.0119	.0693
Impulsivity (IMP)	.0170*	.0166	-.0004	-.0024	.0418
Total	.0557*	.0555	-.0002	.0239	.0892
SS vs. IMP	.0217*	.0222	.0005	-.0126	.0659

Note: IV = Independent Variable, DV = Dependent Variable; a. Recency of alcohol use range (0 – 4), where 0 – never, 1 – more than a year ago, 2 – in the past year, 3 – in the past month, 4 – in the past week; * $p < .05$

Table 17 indicates the results of the INDIRECT analysis, where problematic alcohol use (AUDIT) was entered as dependent variable in the models. None of the mediators

emerged significant in the two models. However, only the total mediating model was significant in the model A3 (Model A3; $F(3, 85) = 4.93, p < .01$).

Table 17. *Multiple Mediator Analyses Examining Indirect Effects of Violence on Problematic Alcohol Use (AUDIT) Through System 1 and 2 processes, and Risky Personality Characteristics in Adolescents*

Models	Point Estimate	Product of Coefficients		Bootstrapping 95% CI	
		<i>SE</i>	<i>Z</i>	Lower	Upper
Model A3, n = 89					
M = System 2 Processes					
DV = AUDIT					
Alcohol Feeling Good Expectancies (FGE)	.0804	.0533	1.5078	.0091	.2067
Future Orientation (FO)	.0388	.0364	1.0662	-.0033	.1539
Total	.1193	.0653	1.8264	.0206	.3069
FGE vs. FO	.0416	.0639	.6505	-.0500	.1660
Model A4, n = 94					
IV = Risky Personality Characteristics					
DV = AUDIT					
Sensation Seeking (SS)	.0264	.0325	.8109	-.0307	.1301
Impulsivity (IMP)	.0766	.0652	1.1748	-.0419	.2446
Total	.1030	.0723	1.4242	-.0205	.2754
SS vs. IMP	-.0502	.0735	-.6838	-.2185	.1305

Note: IV = Independent Variable, DV = Dependent Variable

The point estimates, standard errors, and Z-scores for the individual and total mediation effects for problematic drinking are indicated in Table 18 for undergraduate students. With regards to the mediation of system 1, alcohol coping associations mediated the relationship between perceived violence and frequency of alcohol use (Model U1; $F(2, 467) = 13.75, p < .001$). In relation to system 2 process, future orientation emerged as significant mediator in the relationship between violence and frequency of alcohol use (Model U2; $F(2,$

446) = 9.51, $p < .001$). In relation to risky personality characteristics, sensation seeking significantly mediated the relationship between violence and frequency of alcohol use (Model U3; $F(2, 467) = 10.89, p < .001$).

Table 18. *Multiple Mediator Analyses Examining Indirect Effects of Violence on Frequency of Alcohol Use Through System 1 and 2 processes in Undergraduate Students*

Models	Point Estimate	Product of Coefficients		Bootstrapping 95% CI	
		SE	Z	Lower	Upper
Model U1, n = 470 M = System 1 Processes DV = Frequency of Alcohol Use Alcohol Coping Associations	.0284*	.0127	2.2360	.0074	.0657
Model U2, n = 449 M = System 2 Processes DV = Frequency of Alcohol Use Future Orientation	.0305*	.0126	2.4250	.0099	.0627
Model U3, n = 449 M = Risky Personality Characteristics DV = Frequency of Alcohol Use Sensation Seeking	.0256*	.0115	2.2152	.0075	.0531
Note: IV = Independent Variable, DV = Dependent Variable * $p < .05$					

The point estimates, standard errors, and Z-scores for the individual and total mediation effects are indicated in Table 19 for undergraduate students. With regards to the mediation of system 1, alcohol coping associations mediated the relationship between perceived violence and problematic drinking (Model U4; $F(2, 507) = 24.40, p < .001$). Future Orientation (system 2 process) emerged as significant mediator in the relationship between violence and problematic drinking (Model U5; $F(3, 484) = 11.87, p < .001$). In the model predicting the mediating effect of perceived stress between violence and AUDIT, only the total model emerged as significant (Model U6; $F(2, 485) = 4.24, p < .05$). In relation to risky

personality characteristics, both sensation seeking and impulsivity significantly mediated the relationship between violence and problematic drinking (Model U7; $F(3, 506) = 32.64, p < .001$).

Table 19. Multiple Mediator Analyses Examining Indirect Effects of Violence on Problematic Alcohol Use (AUDIT) Through System 1 and 2 processes, Perceived Stress, and Risky Personality Characteristics in Undergraduate Students

Models	Point Estimate	Product of Coefficients		Bootstrapping 95% CI	
		SE	Z	Lower	Upper
Model U4, n = 510 M = System 1 Processes DV = AUDIT Alcohol Coping Associations	.0515*	.0223	2.3137	.0145	.1035
Model U5, n = 488 M = System 2 Processes DV = AUDIT Alcohol Dealing With Difficulties Expectancy (DWD)	.0247	.0145	1.6959	.0012	.0667
Future Orientation (FO)	.0693**	.0220	3.1532	.0309	.1242
Total	.0940***	.0263	3.5782	.0451	.1587
DWD vs. FO	-.0446	.0265	-1.6874	-.1063	.0065
Model U6, n = 488 M = Perceived Stress DV = AUDIT Past Month Perceived Stress	.0243	.0141	1.7199	.0017	.0615
Model U7, n = 510 IV = Risky Personality Characteristics DV = AUDIT Sensation Seeking (SS)	.0503*	.0237	2.1272	.0081	.1008
Impulsivity (IMP)	.1026***	.0268	3.829	.0579	.1612
Total	.1529***	.0367	4.1667	.0851	.2301
SS vs. IMP	-.0522	.0348	-1.5025	-.1167	.0130

Note: IV = Independent Variable, DV = Dependent Variable * $p < .05$, ** $p < .01$, *** $p < .001$

4.3.6. Analysis for Hypothesis 6

I hypothesized that maltreated individuals have difficulty in system 2 processes, and are more likely to shape coping automatic association in relation to drinking alcohol (system 1), and that this cognitive pathway results in higher rates of problematic alcohol use. For this hypothesis, I only examined the underlying structures from violence to frequency of alcohol use and problematic alcohol use in undergraduate students, as our previous analysis for neglect in undergraduate students and neglect and violence in clinical sample did not indicate any significant relationship between maltreatment and any measure of alcohol use. In addition, no significant relationship was found between system 1 processes and neglect and violence in adolescents.

To examine the role of dual process systems that showed a significant mediating effect in the relationship between maltreatment and frequency of alcohol use, and AUDIT, I used Structural Equation Modeling (SEM) analysis using AMOS version 5 (Arbuckle, 2003). To examine the model fit, I used chi-square statistic tests, Root Mean Square Error of Approximation (RMSEA; Steiger & Lind, 1980) and the Comparative Fit Index (CFI; Bentler, 1990). The Pearson's chi-square statistic is a good method of assessing the fit of data to the model, but is sensitive to the sample size, in that larger sample sizes can produce a great power and thus a significant chi-square, even when model is a good fit of data. The RMSEA is a good approximation of goodness of fit by measuring the discrepancy between a hypothesized model with an estimated covariance matrix and an optimal model with a known population covariance matrix. RMSEA represents the fit per degree of freedom of the model. Values less than .05 imply an excellent fit (Browne & Cudeck, 1993). The CFI compares the fit of a target model with an alternative model, such as the null or independence model where

all correlations equal zero. Values more than .90 show a good fit; values greater than .95 indicate an excellent fit.

Table 120 indicates the goodness of fit indices for each model representing dual system. As indicated in Table 20, structural pathways between variables were significant for all models that represent dual processes as mediators. Findings indicated that the best fitting model is one in which violence is associated with AUDIT via alcohol coping association and future orientation; however, the model predicting the effect of violence on frequency of alcohol use through alcohol coping association and future orientation is also a good fit for the data. Also, as hypothesized those with higher levels of violence have difficulty in system 2 processes and were more likely to shape coping automatic association in relation to drinking alcohol, and that this cognitive pathway resulted in higher rates of problematic alcohol use. Figure 2 and Figure 3 indicate the paths from violence to frequency of alcohol use and problematic alcohol use through dual process systems.

Table 20. *Goodness of Fit Indices for SEM Examining the Dual System Processes as Underlying Structures from Violence to Frequency of Alcohol Use, and Problematic Alcohol Use in Undergraduate Students*

Models	χ^2	df	CFI	RMSEA	90% CI for RMSEA	
					LO 90%	HI 90%
Model U5: Frequency of Alcohol Use	15.96*	8	0.965	0.031	0.005	0.053
Model U6: Problematic Alcohol Use	10.75	8	0.99	0.018	0.000	0.043

N = 510; * $P < .05$; Note. χ^2 : Chi-square statistic tests; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval

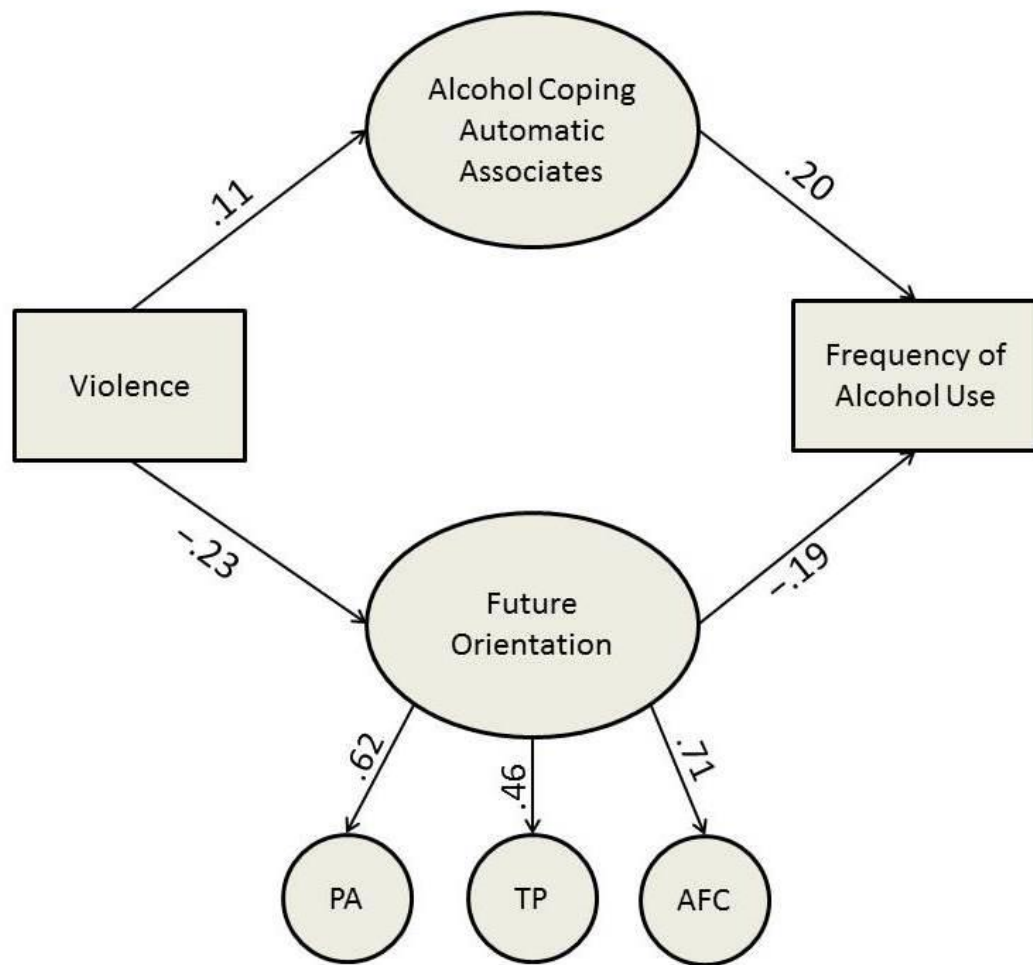


Figure 2. *Model of Associations between Violence, System 1 and 2 Processes, and the Frequency of Alcohol Use*

Note. Numbers represent standardized path coefficients. All path coefficients are significant ($p < .05$). Future orientation subscales: PA = Planning Ahead; TP = Time Perspective; AFC = Anticipation of Future Consequences.

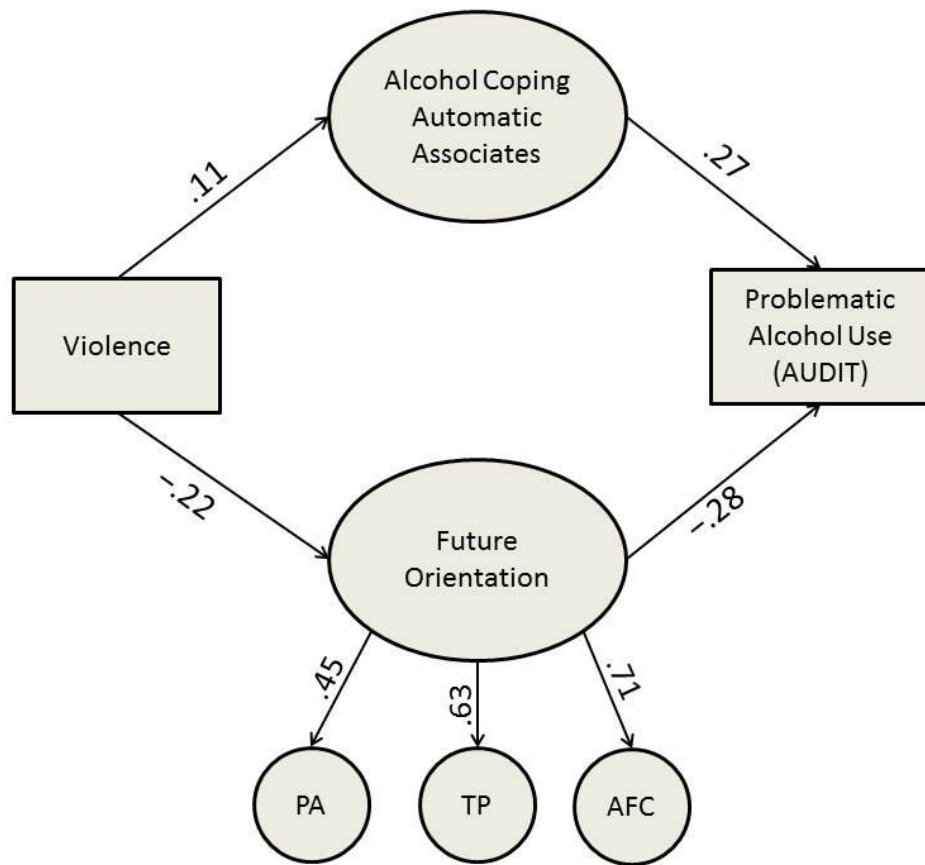


Figure 3. *Model of Associations between Violence, System 1 and 2 Processes, and the Problematic Alcohol Use (AUDIT)*

Note. Numbers represent standardized path coefficients. All path coefficients are significant ($p < .05$). Future orientation subscales: PA = Planning Ahead; TP = Time Perspective; AFC = Anticipation of Future Consequences.

4.3.7. Analysis for Hypothesis 7

I used a sex lens through the analysis, where it was hypothesized that sex differences influence the type of maltreatment experienced and also moderate the effect of maltreatment on perceived stress, dual process processes, risky personality characteristics, and alcohol use. To test this hypothesis, first Generalized Linear Model (GLzM) was used to compare the mean of variables between male and female participants. Then, I conducted GLzM to assess the interacting effect of sex and maltreatment on other variables, including perceived stress, system 1 and 2 processes, risky personality characteristics, and alcohol use in three groups of participants.

4.3.7.1. Descriptive Statistics Based on Sex Differences

Descriptive statistics for perceived maltreatment (neglect and violence), current perceived stress, risky personality characteristics (anxiety sensitivity, negative thinking, impulsivity and sensation seeking), system 1 processes (alcohol word associations), system 2

processes (alcohol outcome expectancies, future orientation and its subscales including planning ahead, time perspective and anticipation of future consequences), and alcohol use (recency, frequency, and quantity of alcohol use and problematic alcohol use) are presented in Table 21, Table 22, and Table 23 for adolescents, undergraduate students, and clinical sample, respectively.

Results of Generalized Linear Model (GLzM) for adolescents are indicated in Table 21. As indicated, females were more likely to report perceived neglect than males $\chi^2 (1) = 3.87, p < .05$). Also, females reported a higher rate of perceived stress in the past month than males ($\chi^2 (1) = 6.69, p < .01$). With regards to risky personality characteristics, females indicated a higher level of negative thinking ($\chi^2 (1) = 5.80, p < .05$). No significant difference was reported for anxiety sensitivity, impulsivity and sensation seeking between males and females. With regards to system 2 processes, males indicated slightly higher in total future orientation scores than females ($\chi^2 (1) = 4.12, p < .05$), but males and females were not significantly different in future orientation subscales. No significant sex difference was found with regards to alcohol outcome expectancies and system 1 processes (alcohol automatic memory associations). In addition, boys and girls were not significantly different in measures of alcohol use.

Table 21. *Descriptive Statistics and Sex Differences for Maltreatment, Perceived Stress, Risky Personality Characteristics, System 1 and 2 Processes, and Alcohol Use in Adolescents*

Variable	Males	Females	Total
Maltreatment	M (SD)	M (SD)	M (SD)
Neglect	11.91 (4.27)	13.45 (4.48)*	12.69 (4.58)
Violence	14.42 (4.61)	13.88 (4.50)	14.14 (4.54)
Perceived Stress	1.53 (.68)	1.83 (.71)**	1.68 (.71)
Risky Personality Characteristics			
Anxiety Sensitivity	2.87 (.81)	2.99 (.78)	2.93 (.79)

Negative Thinking	2.03 (.60)	2.38 (.83)*	2.19 (.74)
Impulsivity	2.73 (.65)	2.72 (.81)	2.72 (.73)
Sensation Seeking	3.29 (.90)	3.29 (.89)	3.29 (.89)
System 1 Processes			
<i>Alcohol Automatic Associations</i>			
Word	1.08 (1.28)	1.18 (1.47)	1.13 (1.37)
Celebrate	.41 (.90)	.72 (1.14)	.57 (1.04)
Social	.11 (.36)	.22 (.67)	.17 (.54)
Coping	.13 (.68)	.25 (.80)	.19 (.75)
System 2 Processes			
<i>Alcohol Outcome Expectancies</i>			
Outcome expectancy liking	-.30 (1.11)	-.45 (1.24)	-.38 (1.18)
Feeling good	1.42 (1.04)	1.45 (1.17)	1.43 (1.11)
Feeling better	.52 (.99)	.57 (.91)	.55 (.94)
Feeling bad	1.59 (1.41)	1.60 (1.36)	1.59 (1.38)
Feeling worse	1.03 (1.21)	1.28 (1.35)	1.16 (1.28)
Future Orientation Total	2.77 (.28)	2.65 (.39)*	2.71 (.34)
Planning Ahead	2.69 (.42)	2.59 (.57)	2.63 (.51)
Time Perspective	2.73 (.40)	2.63 (.49)	2.68 (.45)
Anticipation of Future Consequences	2.86 (.44)	2.77 (.46)	2.81 (.45)
Alcohol Use			
Recency of Alcohol Use	2.77 (1.50)	2.79 (1.49)	2.78 (1.49)
Frequency of Alcohol Use	2.08 (3.12)	2.56 (4.74)	2.32 (4.00)
Quantity of Alcohol Use	1.86 (2.78)	2.62 (3.40)	2.23 (3.10)
Problematic Alcohol Use (AUDIT)	8.00 (6.63)	9.24 (7.58)	8.63 (7.12)

N= 145; * $P < .05$, ** $P < .01$

Based on the results of undergraduate students (Table 22), males were significantly experiences higher degrees of neglect and violence ($\chi^2 (1) = 6.64, p < .01$; and $\chi^2 (1) = 8.99, p < .01$, respectively), whereas females reported a higher rate of perceived stress in the past month ($\chi^2 (1) = 9.05, p < .01$). In relation to risky personality characteristics, males indicated a higher rate of negative thinking, impulsivity, and sensation seeking ($\chi^2 (1) = 3.81, p < .05$, $\chi^2 (1) = 11.16, p < .001$; and $\chi^2 (1) = 44.98, p < .001$, respectively), whereas females showed a higher level of and anxiety sensitivity ($\chi^2 (1) = 25.02, p < .001$, respectively). With regards to system 2 processes, females indicated a better total future orientation than males ($\chi^2 (1) =$

15.71, $p < .001$). This difference was also significant for the two of the subscales of future orientation, including planning ahead and anticipation of future consequences ($\chi^2 (1) = 20.97$, $p < .001$; and $\chi^2 (1) = 10.18$, $p < .001$, respectively). Males reported a higher level of alcohol outcome expectancy liking than females ($\chi^2 (1) = 10.10$, $p < .001$). The most frequently expectancy of drinking alcohol was enjoying things followed by letting go, where females expected a higher letting go expectancy from drinking alcohol ($\chi^2 (1) = 5.90$, $p < .05$). With regards to system 1 processes, the most automatic association of drinking was to celebrate. However, males tended to drink more alcohol to cope compared to females ($\chi^2 (1) = 4.82$, $p < .05$). Finally, in relation to alcohol use, males reported higher frequency, and quantity of alcohol use than females ($\chi^2 (1) = 4.85$, $p < .05$; and $\chi^2 (1) = 14.84$, $p < .001$, respectively). Also, in relation to the problematic alcohol use (AUDIT), males tended to report higher scores on AUDIT ($\chi^2 (1) = 14.74$, $p < .001$) which is indicative of higher frequency and quantity of drinking, higher rate of binge drinking and more problems related to alcohol use.

Table 22. *Descriptive Statistics and Sex Differences for Maltreatment, Perceived Stress, Risky Personality Characteristics, System 1 and 2 Processes, and Alcohol Use in Undergraduate Students*

Variable	Males	Females	Total
Maltreatment	M (SD)	M (SD)	M (SD)
Neglect	11.42 (4.18)	10.48 (3.69)**	10.79 (3.88)
Violence	13.42 (4.29)	12.23 (14.16)**	12.62 (4.23)
Perceived Stress	1.76 (.58)	1.94 (.61)**	1.88 (.61)
Risky Personality Characteristics			
Anxiety Sensitivity	2.93 (.67)	3.25 (.67)***	3.15 (.69)
Negative Thinking	2.36 (.56)	2.27 (.47)*	2.30 (.51)
Impulsivity	2.59 (.66)	2.38 (.64)***	2.45 (.66)
Sensation Seeking	3.68 (.78)	3.21 (.72)***	3.36 (.77)
System 1 Processes			
<i>Alcohol Automatic Associations</i>			
Word	3.14 (2.16)	2.99 (2.20)	3.04 (2.19)
Sex	.22 (.48)	.17 (.49)	.18 (.49)

Celebrate	1.53 (1.37)	1.33 (1.37)	1.40 (1.37)
Social	.64 (1.12)	.63 (.96)	.63 (1.01)
Coping	.46 (1.06)	.28 (.72)*	.34 (.85)
System 2 Processes			
<i>Alcohol Outcome Expectancies</i>			
Outcome expectancy liking	.50 (1.00)	.19 (1.02)**	.29 (1.03)
Letting go	1.67 (1.43)	1.97 (1.25)*	1.87 (1.32)
Dealing with difficulties	.74 (1.05)	.74 (1.02)	.74 (1.03)
Enjoying things	2.16 (1.28)	2.00 (1.26)	2.05 (1.27)
Impairment	1.31 (1.16)	1.41 (1.21)	1.38 (1.19)
Enhancing experience	1.25 (1.23)	1.21 (1.26)	1.22 (1.25)
Future Orientation Total	2.76 (.32)	2.88 (.33)***	2.84 (.33)
Planning Ahead	2.73 (.43)	2.93 (.49)***	2.87 (.48)
Time Perspective	2.72 (.42)	2.75 (.40)	2.74 (.41)
Anticipation of Future Consequences	2.82 (.45)	2.95 (.42)**	2.91 (.43)
Alcohol Use			
Recency of Alcohol Use	4.18 (1.26)	4.16 (1.10)	4.17 (1.15)
Frequency of Alcohol Use	5.41 (5.02)	4.35 (4.77)*	4.69 (4.87)
Quantity of Alcohol Use	4.15 (3.94)	2.97 (2.52)***	3.36 (3.11)
Problematic Alcohol Use (AUDIT)	13.98 (8.11)	11.47 (6.33)***	12.29 (7.05)

N= 510; * $P < .05$, ** $P < .01$, *** $P < .001$

Descriptive statistics for experience of maltreatment (neglect and violence), perceived stress, risky personality characteristics, system 1 and 2 processes, and AUDIT (problematic alcohol use) for clinical sample are presented in Table 23. Results indicated that there are some trivial differences between males and females in this sample, but none of them was significant.

Table 23. *Descriptive Statistics and Sex Differences for Maltreatment, Perceived Stress, Risky Personality Characteristics, System 1 and 2 Processes, and Alcohol Use in Clinical Sample*

Variable	Males	Females	Total
Maltreatment	M (SD)	M (SD)	M (SD)
Neglect	16.10 (4.89)	14.27 (5.17)	15.69 (5.05)
Violence	17.92 (4.31)	19.00 (4.46)	18.29 (4.40)

Perceived Stress	2.07 (.73)	2.34 (.54)	2.14 (.69)
Risky Personality Characteristics			
Anxiety Sensitivity	3.12 (.73)	3.05 (.77)	3.10 (.73)
Negative Thinking	2.46 (.83)	2.46 (.81)	2.53 (.82)
Impulsivity	2.94 (.66)	3.05 (.69)	2.96 (.67)
Sensation Seeking	3.28 (.74)	2.99 (.85)	3.20 (.78)
System 1 Processes			
<i>Alcohol Automatic Associations ^a</i>			
Word	2.06 (1.91)	2.58 (2.06)	2.18 (1.95)
Sex	.58 (.10)	1.00 (1.41)	.64 (1.01)
Celebrate	1.42 (1.56)	1.50 (.71)	1.43 (1.45)
Social	1.08 (1.31)	1.00 (1.41)	1.07 (1.27)
Coping	2.42 (3.00)	3.00 (4.24)	2.50 (3.01)
System 2 Processes			
<i>Alcohol Outcome Expectancies</i>			
Outcome expectancy liking	.62 (1.36)	.84 (1.49)	.66 (1.37)
Letting go	1.31 (1.44)	1.31 (1.44)	1.31 (1.43)
Dealing with difficulties	.89 (1.13)	1.23 (1.50)	.98 (1.24)
Enjoying things	1.35 (1.39)	1.19 (1.36)	1.31 (1.37)
Impairment	1.25 (1.37)	1.23 (1.42)	1.26 (1.38)
Enhancing experience	.93 (1.26)	.73 (1.19)	.89 (1.24)
Future Orientation Total	2.53 (.37)	2.64 (.23)	2.57 (.34)
Planning Ahead	2.46 (.50)	2.62 (.52)	2.52 (.51)
Time Perspective	2.55 (.53)	2.54 (.46)	2.55 (.51)
Anticipation of Future Consequences	2.62 (.45)	2.73 (.39)	2.65 (.44)
Alcohol Use			
Recency of Alcohol Use	3.18 (1.06)	3.04 (1.12)	3.16 (1.08)
Frequency of Alcohol Use	4.80 (9.85)	7.20 (11.51)	5.34 (10.21)
Quantity of Alcohol Use	2.20 (3.88)	2.19 (3.94)	2.20 (3.86)
Problematic Alcohol Use (AUDIT)	18.97 (12.59)	24.15 (13.38)	19.70 (12.85)

N=100; a. only 14 participants (2 females) completed questions related to sex, celebrate, social, and coping automatic associations.

4.3.7.2. Interacting Effect of Maltreatment and Sex

To test the moderating effect of sex on the relationship between maltreatment and other variables, including perceived stress, system 1 and 2 processes, risky personality characteristics, and alcohol use, I conducted Generalized Linear Models (GLZMs) in three groups of participants. Separate models were used for each dependent variable, and the interacting effect of Violence \times Sex and Neglect \times Sex were entered as independent variables simultaneously. Results are indicated in Table 24, 25, and 26 for adolescents, undergraduate students, and clinical sample, respectively.

In adolescents (Table 24), the relationship between violence and perceived stress was only significant in females, and females exposed to violence were more likely to report perceived stress in the last month than males ($F(4, 127) = 10.60, p < .001$). With regards to risky personality characteristics, neglect had a negative effect on anxiety sensitivity in men, but no significant sex difference was found between two groups. In the model predicting the interacting effect of sex and maltreatment on negative thinking, violence only had an effect on negative thinking in female adolescents, however no difference was found between men and women in the effect of violence on negative thinking. Also, sex differences was significant in the relationship between neglect and negative thinking, in which neglected men were more likely to experience negative thinking ($F(4, 127) = 13.16, p < .001$). Perceived violence had a significant effect on impulsivity both in males and females; however, males exposed to violence were more likely to be more impulsive than females ($F(4, 127) = 13.46, p < .001$). The interacting effect of both violence and neglect and sex was significantly increased the likelihood of sensation seeking, however, men were more likely to be affected ($F(4, 127) = 8.03, p < .001$; and $F(4, 127) = 4.10, p < .05$; respectively); the interacting effect of sex with

neglect on sensation seeking was only significant for males, in that males were more likely to receive lower scores in sensation seeking than neglected females. No significant moderating effect of sex or sex difference was found in system 1 processes in this group. With regards to alcohol outcome expectancy, the interacting effect of female and violence on alcohol feeling good expectancy was significant, and females exposed to violence were more likely to report drinking to feel good ($F(4, 127) = 3.02, p < .001$). Also, significant sex differences were found in the models testing the interacting effect of sex and neglect on future orientation and its subscales planning ahead ($F(4, 121) = 3.67, p < .001$; and $F(4, 124) = 4.53, p < .001$, respectively), in that neglected females indicated lower scores in total future orientation than males, whereas neglected males were more likely to show lower scores in planning ahead. Although the interacting effect of sex and neglect on anticipation of future consequences in females, boys and girls were not significantly different in the model. The only measure of alcohol use that indicated a significant sex difference was recency of alcohol use ($\chi^2(4) = 10.61, p < .01$), in which females exposed to violence reported more recent drinking than males.

Table 24. *Generalized Linear Analysis of the Interactive Effects of Maltreatment and Sex on Perceived Stress, Risky Personality Characteristics, System 1 and 2 Processes, and Alcohol Use in Adolescents*

Maltreatment × Sex	Violence × Male	Violence × Female	Neglect × Male	Neglect × Female	
	B (SE)	B (SE)	B (SE)	B (SE)	R ²
Perceived Stress	.05 (.01)	.06 (.02)***	.01 (.02)	.03 (.02)	.274
Risky Personality Characteristics					
Anxiety Sensitivity	.004 (.02)	-.02 (.02)	-.05 (.02)*	-.01 (.02)	.047
Negative Thinking	-.004 (.02)	.04 (.02)*	.08 (.02)***	.05 (.02)**	.293
Impulsivity	.08 (.02)***	.06 (.02)**	-.03 (.02)	-.001 (.02)	.182
Sensation Seeking	.08 (.02)***	.06 (.03)*	-.06 (.02)*	-.04 (.03)	.124
System 1 Processes					
<i>Alcohol Automatic Associations</i>					

Word	.01 (.04)	.01 (.04)	.03 (.05)	.04 (.04)	.018
Celebrate	.003 (.03)	.01 (.03)	.02 (.04)	.03 (.01)	.036
Social	.001 (.02)	-.01 (.02)	-.003 (.02)	.02 (.02)	.017
Coping	.01 (.02)	-.01 (.02)	-.004 (.03)	.03 (.02)	.027
System 2 Processes					
<i>Alcohol Outcome Expectancies</i>					
Outcome expectancy liking	.01 (.03)	.04 (.04)	.05 (.03)	-.01 (.04)	.039
Feeling good	.05 (.03)	.07 (.03)*	.003 (.03)	-.01 (.03)	.052
Feeling better	-.01 (.02)	.04 (.03)	.03 (.03)	-.03 (.03)	.021
Feeling bad	-.04 (.03)	-.02 (.04)	.004 (.04)	-.01 (.04)	.012
Feeling worse	-.05 (.03)	-.04 (.04)	-.01 (.04)	.01 (.04)	.035
Future Orientation Total	-.01 (.01)	-.01 (.01)	-.01 (.01)	-.02 (.01)*	.163
Planning Ahead	-.02 (.01)	-.02 (.01)	-.03 (.01)*	-.03 (.01)*	.155
Time Perspective	-.02 (.01)	-.01 (.01)	.00 (.01)	-.01 (.01)	.057
Anticipation of Future Consequences	-.02 (.01)	-.01 (.01)	-.02 (.01)	-.03 (.01)*	.107
Alcohol Use					
Recency of Alcohol Use ^a	.11 (.04)*	.15 (.06)**	.03 (.05)	-.01 (.05)	-
Frequency of Alcohol Use	.02 (.11)	.04 (.15)	.23 (.12)	.24 (.15)	.101
Quantity of Alcohol Use	.05 (.09)	.07 (.12)	.01 (.10)	.05 (.12)	.034
Problematic Alcohol Use (AUDIT)	.32 (.20)	.08 (.23)	-.005 (.21)	.33 (.26)	.060

N= 145; a. Ordinal logistic regression model was used in for Recency of alcohol use (range: 0 – 4), where 0 – never, 1 – more than a year ago, 2 – in the past year, 3 – in the past month, 4 – in the past week; * $P < .05$, ** $P < .001$, *** $P < .001$

Results from GLZMs for undergraduate students are shown in Table 25. As indicated, the relationship between neglect and perceived stress was significant in both groups, and females exposed to neglect were more likely to report higher current perceived stress than males ($F(4, 483) = 10.76, p < .001$). With regards to risky personality characteristics, in the model predicting the interacting effect of sex and maltreatment on negative thinking, violence only had an effect on female negative thinking, but no sex difference was found. Perceived neglect had a significant effect both in males and females; however, males indicated a higher relationship between neglect and negative thinking ($F(4, 505) = 14.60, p < .001$). Perceived

violence had a significant effect on impulsivity both in males and females, whereas males exposed to violence indicated a higher level of impulsivity than females ($F(4, 505) = 16.03, p < .001$). Neglect had a significant effect on impulsivity in females, and neglected females received higher scores in impulsivity than males ($F(4, 505) = 8.58, p < .001$). Similar to adolescents, the interacting effect of both violence and neglect and sex significantly increased the likelihood of sensation seeking, however, men were more likely to be affected ($F(4, 505) = 15.54, p < .001$; and $F(4, 505) = 10.76, p < .001$, respectively); the interacting effect of sex and violence on sensation seeking was only significant for neglected males. With regards to system 1 processes, only the interacting effect of maltreatment (neglect and violence) and sex on alcohol word associations was significant in males; however the sex difference was only significant for neglect ($F(4, 505) = 3.30, p < .05$). With regards to alcohol outcome expectancy, dealing with difficulties was significantly higher in females exposed to violence ($F(4, 505) = 8.27, p < .001$), and in neglected males ($F(4, 505) = 4.49, p < .05$) compared to the other sex. In addition, neglected males reported less alcohol enjoying things and enhancing experience expectancies, but no significant sex differences were observed in these models. In general, in the models testing the interacting effect of maltreatment and sex on future orientation and its subscales, males exposed to violence and neglected females were more likely to receive lower scores, and the sex difference was significant for the effect of violence \times sex and neglect \times sex on total future orientation score ($F(4, 483) = 2.93, p < .05$; and $F(4, 483) = 8.04, p < .001$, respectively), neglect \times sex on time Perspective ($F(4, 498) = 6.01, p < .01$), and violence \times sex and neglect \times sex on anticipation of future consequences ($F(4, 496) = 3.71, p < .05$; and $F(4, 496) = 8.79, p < .001$, respectively). Among measures of alcohol use, frequency, and quantity of alcohol use ($F(4, 465) = 3.58, p < .05$; and $F(4, 446) = 3.34,$

$p < .05$, respectively), and problematic alcohol use (AUDIT; $F(4, 505) = 4.34$, $p < .05$) indicated a significant sex difference, in that males exposed to violence reported a higher quantity of drinking and more problematic alcohol use than females with such experiences.

Table 25. *Generalized Linear Analysis of the Interactive Effects of Maltreatment and Sex on Perceived Stress, Risky Personality Characteristics, System 1 and 2 Processes, and Alcohol Use in Undergraduate Students*

Maltreatment × Sex	Violence × Male	Violence × Female	Neglect × Male	Neglect × Female	
	B (SE)	B (SE)	B (SE)	B (SE)	R ²
Perceived Stress	.01 (.01)	.01 (.01)	.03 (.01)**	.04 (.01)***	.094
Risky Personality Characteristics					
Anxiety Sensitivity	.01 (.01)	.01 (.01)	-.01 (.01)	.01 (.01)	.059
Negative Thinking	-.01 (.01)	.01 (.01)*	.08 (.01)***	.06 (.01)***	.280
Impulsivity	.05 (.01)***	.02 (.01)*	.02 (.01)	.04 (.01)***	.143
Sensation Seeking	.06 (.01)***	.004 (.01)	-.05 (.01)***	-.03 (.01)*	.124
System 1 Processes					
<i>Alcohol Automatic Associations</i>					
Word	.07 (.03)*	.05 (.03)	-.08 (.04)*	-.07 (.04)	.017
Sex	-.003 (.01)	.001 (.01)	.004 (.01)	-.004 (.01)	.002
Celebrate	.01 (.02)	.02 (.02)	-.01 (.02)	-.03 (.02)	.008
Social	.001 (.02)	.01 (.02)	-.01 (.02)	-.01 (.02)	.001
Coping	.01 (.01)	.02 (.01)	.02 (.01)	.002 (.01)	.023
System 2 Processes					
<i>Alcohol Outcome Expectancies</i>					
Outcome expectancy liking	.01 (.02)	-.02 (.02)	-.01 (.02)	.00 (.02)	.021
Letting go	-.02 (.02)	-.03 (.02)	-.02 (.02)	.01 (.02)	.014
Dealing with difficulties	.01 (.02)	.06 (.02)***	.05 (.02)**	-.01 (.02)	.048
Enjoying things	.03 (.02)	.001 (.02)	-.05 (.02)*	-.02 (.02)	.013
Impairment	-.01 (.02)	-.01 (.02)	-.02 (.02)	-.02 (.02)	.009
Enhancing experience	.04 (.02)	.002 (.02)	-.05 (.02)*	-.02 (.02)	.012
Future Orientation	-.01 (.01)*	-.002 (.01)	-.01 (.01)**	-.02 (.01)**	.089
Total					
Planning Ahead	-.02 (.01)*	-.001 (.01)	-.01 (.01)	-.02 (.01)*	.059
Time Perspective	-.001 (.01)	.003 (.01)	-.02 (.01)*	-.02 (.01)**	.030
Anticipation of Future Consequences	-.02 (.01)**	-.002 (.01)	-.02 (.01)*	-.03 (.01)***	.086

Alcohol Use

Recency of Alcohol Use ^a	.05 (.03)	.02 (.03)	-.01 (.04)	-.003 (.03)	-
Frequency of Alcohol Use	.21 (.08)*	.10 (.08)	-.08 (.10)	-.02(.08)	.022
Quantity of Alcohol Use	.31 (.05)*	.01 (.05)	-.05 (.06)	.01 (.05)	.037
Problematic Alcohol Use (AUDIT)	.30 (.11)**	-.04 (.10)	-.06 (.12)	.14 (.12)	.040

N= 510; a. Ordinal logistic regression model was used in for Recency of alcohol use (range: 0 – 4), where 0 – never, 1 – more than a year ago, 2 – in the past year, 3 – in the past month, 4 – in the past week; * $P < .05$, ** $P < .001$, *** $P < .001$

Results of the interacting effect of maltreatment and sex on perceived stress, system 1 and 2 processes, risky personality characteristics, and alcohol use are indicated in clinical sample in Table 26. As indicated, the relationship between neglect and perceived stress was significant in both groups, and neglected males were more likely to report higher current perceived stress than females ($F(4, 74) = 4.28, p < .05$). With regards to risky personality characteristics, in the model predicting the interacting effect of sex and maltreatment on anxiety sensitivity, although violence had a negative and significant relationship with anxiety sensitivity, no significant sex difference was observed in this models. However, a significant sex difference was found in the relationship between neglect and anxiety sensitivity ($F(4, 92) = 3.15, p < .05$), despite the non-significant relationship within groups. Violence only had an effect on male negative thinking, and males exposed to violence were more likely to report negative thinking than females ($F(4, 92) = 3.60, p < .05$). Males exposed to violence and neglected females were more likely to report higher levels of impulsivity ($F(4, 92) = 5.49, p < .01$; and $F(4, 92) = 3.29, p < .05$; respectively), and lower levels of sensation seeking ($F(4, 92) = 4.35, p < .05$; and $F(4, 92) = 3.77, p < .05$; respectively). With regards to system 1 processes, sex differences were found in the model predicting interacting effect of

maltreatment and sex on alcohol sex associations ($F(4, 9) = 14.59, p < .001$; and $F(4, 9) = 4.11, p < .05$, for violence and neglect, respectively), and violence and sex on alcohol social associations ($F(4, 9) = 5.71, p < .05$); however, as mentioned before, because of the small number of participants ($n=14$) who completed questions of automatic alcohol associations, results related to this variables are not reliable. With regards to alcohol outcome expectancy, alcohol letting go expectancy was significantly higher in neglected females; however, sex difference was not significant. Also, dealing with difficulties expectancy was higher in females exposed to violence, but sex difference was not significant in this model. In the models testing the interacting effect of maltreatment and sex on anticipation of future consequences, only males who were exposed to violence indicated a negative and significant relationship with this variable, and also these males were more likely to receive lower scores in anticipation of future consequences than women with such histories ($F(4, 82) = 4.73, p < .05$). Among measures of alcohol use, no significant sex difference was found.

Table 26. *Generalized Linear Analysis of the Interactive Effects of Maltreatment and Sex on Perceived Stress, Risky Personality Characteristics, System 1 and 2 Processes, and Alcohol Use in Clinical Sample*

Maltreatment × Sex	Violence × Male	Violence × Female	Neglect × Male	Neglect × Female	
	B (SE)	B (SE)	B (SE)	B (SE)	R ²
Perceived Stress	.01 (.02)	.03 (.03)	.05 (.02)**	.04 (.03)***	.094
Risky Personality Characteristics					
Anxiety Sensitivity	.01 (.02)	-.05 (.02)*	-.03 (.02)	.04 (.03)	.068
Negative Thinking	.05 (.02)*	.04 (.03)	.03 (.02)	.04 (.03)	.120
Impulsivity	.05 (.02)**	.01 (.02)	-.01 (.02)	.06 (.02)*	.131
Sensation Seeking	.01 (.02)	-.06 (.03)*	-.04 (.02)*	.02 (.03)	.122
System 1 Processes					
<i>Alcohol Automatic Associations^a</i>					
Word	-.04 (.05)	-.04 (.07)	-.03 (.05)	.01 (.07)	.025
Sex	.21 (.04)***	.50 (.19)*	-.08 (.03)*	-.43 (.23)	.800
Celebrate	.27 (.11)*	.25 (.46)	-.02 (.08)	-.04 (.55)	.439

Social	.25 (.08)*	.50 (.36)	-.04 (.06)	-.37 (.42)	.566
Coping	.32 (.24)	1.50 (1.07)	-.004 (.19)	-1.39 (1.28)	.296
System 2 Processes					
<i>Alcohol Outcome Expectancies</i>					
Outcome expectancy	.004 (.05)	.01 (.05)	-.02 (.05)	-.12 (.06)	.080
liking					
Letting go	.04 (.04)	-.002 (.05)	.04 (.03)	.10 (.05)*	.058
Dealing with	.06 (.03)	.09 (.04)*	.02 (.03)	.00 (.04)	.075
difficulties					
Enjoying things	-.01 (.04)	.03 (.05)	.02 (.03)	-.04 (.05)	.013
Impairment	.02 (.04)	-.03 (.05)	.001 (.03)	.06 (.05)	.014
Enhancing experience	.01 (.03)	.01 (.04)	-.01 (.03)	-.01 (.05)	.006
Future Orientation					
Total	-.02 (.01)	-.01 (.01)	-.003 (.01)	-.01 (.01)	.065
Planning Ahead	-.01 (.01)	-.01 (.02)	.003 (.01)	-.01 (.02)	.030
Time Perspective	-.01 (.01)	-.01 (.02)	.002 (.01)	.002 (.02)	.003
Anticipation of Future	-.04 (.01)**	-.02 (.02)	.002 (.01)	-.01 (.02)	.112
Consequences					
Alcohol Use					
Recency of Alcohol	-.01 (.05)	-.09 (.07)	-.01 (.04)	.09 (.07)	-
Use ^b					
Frequency of Alcohol	.36 (.29)	-.31 (.46)	-.04 (.26)	.93 (.52)	.057
Use					
Quantity of Alcohol	-.09 (.36)	.06 (.64)	.04 (.32)	.37 (.76)	.059
Use					
Problematic Alcohol	.68 (.37)	.20 (.47)	.33 (.34)	.85 (.52)	.074
Use (AUDIT)					

N= 100; a. only 14 participants (2 females) completed questions related to sex, celebrate, social, and coping automatic associations; b. Ordinal logistic regression model was used in for Recency of alcohol use (range: 0 – 4), where 0 – never, 1 – more than a year ago, 2 – in the past year, 3 – in the past month, 4 – in the past week; * $P < .05$, ** $P < .001$, *** $P < .001$

5. Chapter Five. Discussion

The current dissertation aimed to answer one main question: how does perceived maltreatment, including neglect and violence, influence alcohol use and problematic drinking in three high risk groups of participants? To answer this question, I examined three main factors, including dual process systems, risky personality characteristics, and current perceived stress in the path from maltreatment to alcohol use in three different groups: adolescents, undergraduate students, and clinical patients under treatment for substance use disorders. First, I explored the effect of perceived maltreatment, including neglect and violence, on dual process systems, risky personality characteristics, and current perceived stress; then, I tested the mediating effect of these factors in the relationship between the experience of maltreatment and alcohol use and problematic drinking; Finally, I examined these underlying mechanisms in the pathways from maltreatment to alcohol use and problematic drinking in three groups. I was also interested to understand whether sex

differences impact the relationship between maltreatment and drinking. Thus, I tested the interacting effect of maltreatment and sex on dual process systems, risky personality characteristics, and current perceived stress, and alcohol use. In this chapter, the results of the studies in three groups are discussed in order of the analysis. In general, the results of the current dissertation provided strong support of hypotheses in undergraduate students, and partial supports of hypotheses in adolescents, and the clinical patients. Although the findings differed for clinical patients, the findings were generally consistent across adolescents and undergraduate students. At the end of this chapter, clinical implications, limitations of our studies, and directions for future research are presented.

Data from the demographic information (Table 2) indicated as expected that on average participants represented three different courses of life, including adolescence, young adulthood, and middle adulthood. Almost equal males and females were in the adolescent group, whereas female undergraduate students participated almost twice as much as males in this group. In clinical sample, the number of males was three times more than female participants; however, there were enough male and female participants in all three groups to allow for tests of my hypotheses related to sex differences. Ethnicity showed almost similar patterns of distribution in all three groups; however, there were more First Nation participants in the clinical sample. Among adolescents, the majority of students were in grade 8-10 (95%). In the clinical sample, the majority of participants' education level was some diploma or under (68%). In clinical sample and undergraduate students, the majority of participants were never married/single (67% and 63%, respectively).

5.1. Relationship between Maltreatment, Perceived Stress, Dual Process Systems, Risky Personality Characteristics, and Alcohol Use

In the following section the bivariate relationships between maltreatment, perceived stress, system 1 and system 2 processes, risky personality characteristics, and alcohol use are discussed in adolescents, undergraduate students, and clinical patients.

5.1.1. Bivariate Relationship between Maltreatment and Alcohol Use

In line with other research in this area, the results of this dissertation indicated that neglect and violence were highly correlated with each other in adolescents and undergraduate students (Table 4 & 6), indicating those exposed to one type of maltreatment were more likely to experience the other one. Previous studies indicated that maltreatment does not occur in isolation and most individuals who have been exposed to one type of maltreatment also suffered from other types (e.g., Bernstein et al., 2003; Dong et al., 2004; Finkelhor et al., 2009; Finkelhor et al., 2007b; Perkins & Graham-Bermann, 2012). This finding is particularly relevant for neglect, as neglect is known as a precedent for other types of maltreatment, and usually co-occurs with them (Rutter & Sroufe, 2000; Sameroff, 2000). This dependent relationship is likely due to the fact that the lack of adequate care and supervision can put individual in higher risk for perceived violence and abuse. Nonetheless, neglect and violence were not correlated with each other in the clinical sample (Table 8). It is important to mention that this sample included participants with complex psychiatric disorders. We did not control for comorbidities of current and lifetime psychiatric diagnoses for this dissertation, which might influence the results. Nevertheless, the rates of both neglect and violence were considerably higher in the clinical sample, compared to other groups (Table 3). In addition, the cumulative effect of maltreatment can result in worse outcomes and more impairment in adults than exposure to single type of maltreatment (Higgins & McCabe, 2000). Therefore, given the high correlations between neglect and violence in adolescents and undergraduate

students (young adults), future research may consider the assessment of the cumulative effect of maltreatment, in addition to separate effect of maltreatment types in clinical groups with comorbid disorders and complex diagnosis.

In both adolescents and undergraduate students, perceived violence was associated with higher rates of problematic alcohol use (AUDIT; Table 4 & 6). Perceived violence was also related to more recent alcohol use in adolescents and frequency of alcohol use in undergraduate students. These findings are consistent with previous studies that indicated witnessing two or more episodes of violence compared to none increased the likelihood of using alcohol and illicit drugs two-fold in youth (Vermeiren et al., 2003). Also, individuals that experienced two or more maltreatment types, compared to none, are at a higher risk of alcohol abuse even after controlling for socio-demographic and other variables (Pilowsky et al., 2009). Consistent with previous studies that showed neglect is connected to problematic alcohol use in youth (Dube et al., 2006), perceived neglect was related to the frequency of alcohol use in our adolescent group. In clinical sample, perceived maltreatment was not associated with any measure of alcohol use (Table 8). We suggest several explanations for this phenomenon; first, there is little research on the consequences of neglect and in most of these studies, the effects of neglect and abuse fused into a single unit. Moreover, the definition of neglect can be controversial and was mostly defined based on personal perceptions of neglect; therefore, it is not clear what the enough care is. Therefore, a range of other factors might be taken into consideration to interpret the effects of neglect on alcohol use. Second, although exposure to neglect accelerates the initiation of substance use, some of the adverse effects of neglect may not appear until young adulthood. For example, in a longitudinal study by Chapple, Tyler, and Bersani (2005), there was a 12-year lag between exposure to childhood

neglect and increased delinquency later in young adulthood. Also, it has been indicated that exposure to neglect and abuse is a predictor of arrests for alcohol or drug-related offenses in adults not adolescents (Ireland & Widom, 1994). Together, our findings point to the possibility that violence has a greater impact on risk of alcohol use and problematic drinking in both adolescents and young adults.

For the clinical sample, however, the explanation of the absence of a relationship is more difficult, as previous studies have connected maltreatment to vulnerability of substance use (Gerra et al., 2009; Grabe et al., 2010; Schafer et al., 2010), and the severity and duration of substance abuse symptoms (Andersen & Teicher, 2009) in clinical samples. In this dissertation, however, we only assessed the relationship between maltreatment and alcohol use. Many factors, including comorbidity of other psychiatric disorders and using other types of substances might have influenced this relationship. In addition, patients who participated in this study were assessed in a residential center, where they can stay for several months, and reporting alcohol and drug use during this time might result in expelling them from the centre. Therefore, the rate of alcohol use might be underreported even after a promise to respect the confidentiality in research. Lack of a significant relationship between maltreatment and alcohol use is not without precedent. For example, there are studies that indicated child maltreatment was not associated with alcohol, but was related to alcohol consequences (Goldstein et al., 2010; Vilhena, Goldstein, & Flett, 2010; Vilhena, 2011). Consistent with these findings, it is noticeable that only the significant relationships were between violence and problematic alcohol use in undergraduate students, and violence and problematic alcohol use and recency of alcohol use in adolescents. No significant relationship was found between maltreatment and frequency and quantity of alcohol use. Problematic alcohol is indicative of

higher frequency and quantity of drinking and higher rate of binge drinking but is also associated with more problems related to alcohol use. Therefore, higher scores in AUDIT represent heavy alcohol use and problems with drinking alcohol, rather than just higher frequency and quantity of drinking. In adolescents, the recency of use might be the most important measure of alcohol use and more indicative of problems than in older youth. This measure is more important for this age group because they have less opportunity to access to alcohol that can considerably restrict their frequent use or the quantity of use in this period of life. Thus, the recency of alcohol use is more likely to represent risky drinking in this group, compared to undergraduate students and clinical patients that have legal access to alcohol and can afford buying it. Finally, there is limited research investigating the relationship between violence, neglect and alcohol use in clinical patients. The negative findings in the clinical sample may be impacted by the specific measures used that were designed to be sensitive to lower levels of perceived violence and neglect in a non-reportable format. It is noteworthy in this regard that the levels of perceived violence and neglect were highest in the clinical sample (Tables 3).

In all three groups of participants, all measures of alcohol use were positively and significantly correlated with each other (Tables 4, 6, & 8). It is important to mention that the recency of use might be the most important measure of alcohol use in adolescents. As adolescents have less opportunity to access alcohol legally, which can considerably restrict their frequent use or the quantity of use, more recent alcohol use represents risky drinking in this group. In the other two groups, problematic alcohol use (AUDIT), which is indicative of higher frequency and quantity of drinking, higher rate of binge drinking, and more problems related to alcohol use, is a better indicative of risky drinking and the related problems.

5.1.2. Bivariate Relationship among Maltreatment, Alcohol Use, and Perceived Stress

Perceived stress in the past month was related to higher levels of both neglect and violence in adolescents and undergraduate students, and to higher neglect in clinical sample (see Tables 4, 6, and 8). This finding is in line with previous studies that indicated maltreatment increases the vulnerability to the effect of later stressful life events, and also predicts continuing exposure to stressful and adverse events and circumstances in those with such histories (Pearlin, 1989). The number of adversities and life adverse events experienced in childhood and adolescence is a predictor of the number of life adverse events and chronic stressors experienced into adulthood (Hazel et al., 2008; Turner & Butler, 2003; Turner & Turner, 2005). Previous exposure to maltreatment can also lead to continued stress and life adverse exposures in elementary and middle school students (Cole et al., 2006). The experience of such events might make the person vulnerable to further risk for substance abuse to decrease negative affect, reduce stress, and cope with problems (Jones-Webb et al., 1996; Leigh, 1989). Although causality cannot be determined through these analyses, this explanation is in some way consistent with our finding that showed a significant and positive relationship between perceived stress and problematic alcohol use in undergraduate students and clinical sample; however, this relationship was not significant in adolescents. A recent study (Sebena et al., 2012) indicated that perceived stress is related to more problematic drinking, but not a higher frequency of drinking. It may partly explain the lack of a significant relationship between perceived stress and measures of alcohol use, as problematic alcohol use in adolescents was not as prevalent as undergraduate students and clinical sample (Table 3).

5.1.3. Bivariate Relationship among Maltreatment, Alcohol Use, and Risky Personality Characteristics

I found a significant positive relationship between both neglect and violence and higher levels of negative thinking in adolescents and undergraduate students (Tables 4 & 6), and a significant positive relationship between neglect and negative thinking in the clinical sample (Tables 8). It has been previously suggested by Gibb (2002) that there is an association between both childhood emotional and sexual maltreatment and negative cognitive styles, which consequently increases the vulnerability to symptoms and diagnoses of depression. Negative cognitive styles can lead to more symptoms of anhedonia and depression, and rating reward cues less positively, which has been observed in individuals exposed to childhood maltreatment (Dillon et al., 2009).

In contrast, neglected adolescents showed lower levels of anxiety sensitivity (Table 4). The findings related to maltreatments and anxiety sensitivity may be explained by the different effects of maltreatment on HPA axis and cortisol response to stress. Although some studies indicated higher cortisol and adrenocorticotrophic hormone (ACTH) reactivity to stress and challenge (Heim et al., 2002; Heim, Mletzko, Purselle, Musselman, & Nemeroff, 2008), other studies report attenuated cortisol responses to stressors in maltreated individuals (e.g., Carpenter et al., 2007; MacMillan et al., 2009; Ouellet-Morin et al., 2011). The presence of internalizing or externalizing symptoms may influence level of cortisol response in maltreated children (Cicchetti & Rogosch, 2001). For example, exposure to maltreatment was linked to attenuated cortisol response in the presence of concurrent internalizing symptoms in school-age children (Cicchetti, Rogosch, Gunnar, & Toth, 2010). Therefore, the impact of neglect on lower levels of anxiety sensitivity in adolescents might be explained by the presence of

internalizing symptoms. We did not assess for the internalizing/externalizing symptoms, however, higher levels of current perceived stress in neglected adolescents, which can be indicative of presence of the internalizing symptoms, suggest a need for more precise assessment of these symptoms in the future studies.

Individuals reporting negative affect (e.g., depression and anxiety) are more prone to negative reinforcement effects of alcohol use (Comeau et al., 2001; Cooper et al., 1995). Some studies have also suggested anxiety and depression symptoms as motives for drinking alcohol and alcohol-related problems (Grant et al., 2007; Treeby & Bruno, 2012); however, I only found a significant relationship between negative thinking and problematic alcohol use in clinical sample (Tables 8). The pattern was rather different for anxiety sensitivity. Consistent with other findings (Krank et al., 2011), anxiety sensitivity was negatively related to the recency and quantity of alcohol use and problematic alcohol use in adolescents and undergraduate students, whereas it was positively correlated to problematic alcohol use in clinical sample. The relationship between anxiety sensitivity and alcohol use has been inconsistent in prior research. Although anxiety sensitivity has been positively correlated to heavy drinking in some studies (Dehaas, Calamari, & Bair, 2002; Koven, Heller, & Miller, 2005), others did not find any significant relationship (Novak, Burgess, Clark, Zvolensky, & Brown, 2003; Zack, Poulos, Fragopoulos, Woodford, & MacLeod, 2006). As suggested by O'Connor, Farrow and Colder (2008), cognitive moderators, including alcohol outcome expectancies, and also gender differences might be responsible for these inconsistencies in the relationship between anxiety sensitivity and alcohol use. These researchers indicated that high level of anxiety sensitivity was related to heavy drinking, only when tension reduction expectancies were high for men, and high anxiety sensitivity was related to low levels of

drinking when impairment expectancies were high for women (O'Connor et al., 2008). The negative relationship between anxiety sensitivity and alcohol use can be also explained by the fact that alcohol can produce similar symptoms to anxiety, such as altered bodily perceptions, and rapid heart rate, particularly shortly after drinking (Lang, Patrick, & Stritzke, 1999). This can result in an aversive response and reduced alcohol use in individuals with high levels of anxiety sensitivity who actively avoid and fear of anxiety symptoms (e.g., increased heart rate; Reiss, 1991).

Disinhibitory pathways are distinguished by two different personality dimensions: Sensation seeking and Impulsivity (Lejuez, Aklin, Bornovalova, & Moolchan, 2005). Consistent with previous studies (Rosenman & Rodgers, 2006; Rutter, 2002), perceived violence was associated with higher levels of impulsivity in both adolescents and clinical patients. Also, both neglect and violence were related to higher levels of impulsivity in undergraduate students. A history of maltreatment has been related with impairment in inhibitory control in childhood (DePrince et al., 2009; Mezzacappa et al., 2001; Pollak et al., 2010), adolescence (Mueller et al., 2010), and adulthood (Navalta et al., 2006).

We found similar results between violence and sensation seeking in adolescents and undergraduate students (Tables 4 & 6), in that those exposed to violence showed higher levels of sensation seeking, whereas this relationship was significantly negative between neglect and sensation seeking in undergraduate students. This implicitly indicates that neglected undergraduate students tended to avoid novel, complex, and intense experiences and the related excitement, which is the main indicative factor of sensation seeking.

Effects of neglect on depression may reduce the relationship between neglect and sensation seeking in undergraduates. Farmer and colleagues (2001) have previously

demonstrated a negative correlation between sensation seeking and depression, and adverse and stressful life events. Lower levels of sensation seeking have also been reported in individuals with low mood in other studies (Carton, Jouvent, Bungener, & Widlöcher, 1992). Lower sensation seeking in neglected individuals can be the result of depressive symptoms and low mood, which has been constantly reported in those with history of neglect (Crittenden, 1992). We also found a positive relationship between neglect and negative thinking in our results that might reduce sensation seeking in this group.

Both disinhibitory pathways are expected to influence alcohol use, albeit through different mechanisms. There is evidence that sensation seeking is associated with self-report motives involving enhancement of positive affect from using alcohol and drugs (Comeau et al., 2001; Cooper et al., 1995; MacPherson et al., 2010). Impulsivity on the other hand plays an important role in the development of substance abuse and dependence by the inability to control behaviour in response to stimuli such as (alcohol and drugs) involving reward or punishment (e.g., James & Taylor, 2007; Jones et al., 2011; MacKillop et al., 2007). Our results indicated that both sensation seeking and impulsivity were positively related to recency of alcohol use, and problematic alcohol use in adolescents and undergraduate students, and to frequency of alcohol use only for undergraduate students. Also, sensation seeking was positively related to the quantity of alcohol use in adolescents, and recency of use in clinical sample. This finding is consistent with previous studies that showed a relationship between inhibitory control, including sensation seeking and impulsivity and alcohol and drug use in adolescence and adulthood (Romer et al., 2009; Tarter et al., 2003; Tarter et al., 2004; Tarter, Kirisci, Reynolds, & Mezzich, 2004). Although consistent with previous findings using the SURPS measures of sensation seeking and impulsivity (Krank et al., 2011), these findings is

different, in part, with the longitudinal study by Romer and colleagues (2011) that identified sensation seeking as a *form* of impulsivity, and not an independent trait. They assessed executive functions in relationship to two forms of impulsivity (sensation seeking and acting without thinking) to predict later engagement in risky behaviours including drug use. They suggested that working memory ability predicted the later relationship between acting without thinking and engagement in risky behaviours better than sensation seeking. These authors have emphasized that unlike impulsivity due to acting without thinking, the impulsivity that is characterized by increased sensation seeking during adolescence is not related to deficits in executive functions (Romer et al., 2011).

5.1.4. Bivariate Relationship among Maltreatment, Alcohol Use, and System 2 Processes

I assessed future orientation and explicit alcohol outcome expectancies to measure System 2 processes in the three groups. In general, perceived maltreatment was correlated to lower future orientation, and also positive and coping expectancies. In adolescents and undergraduate students (see Tables 4 & 6), those reported higher levels of neglect and violence indicated lower scores in total future orientation and its subscales, except for the relationship between neglect and time perspective in adolescents, and the relationship between violence and time perspective in undergraduate students which were not significant. Only neglect had a negative correlation with anticipation of future consequences in the clinical sample (Tables 8).

Consideration of future consequences is predictive of a range of behaviours related to self-control (for a review, see Joireman et al., 2006). It has been found that individuals with high consideration of future consequences show higher self-control, and those with less

concern about future consequences indicate lower self-control (Joireman et al., 2003). In addition, many studies have confirmed the association between maltreatment and impairments of abstract reasoning (Beers & De Bellis, 2002; Mezzacappa et al., 2001; Nolin & Ethier, 2007), problem solving and planning (Nolin & Ethier, 2007), and response inhibition and inhibitory control (DePrince et al., 2009; Navalta et al., 2006; Pollak et al., 2010), which are related to the consideration of future consequences.

Our results indicated that lower scores in future orientation was related to higher levels of alcohol use (Tables 4, 6, & 8). Higher total scores on the future orientation scale were negatively correlated with recency of alcohol use, and problematic alcohol use, whereas two of its subscales, including planning ahead, and anticipation of future orientation were negatively associated with recency of alcohol use in adolescents. In undergraduate students, frequency of alcohol use, and problematic alcohol use were all negatively correlated with total future orientation and its subscales, whereas recency of alcohol use was negatively related to total future orientation, and planning ahead in this group. No significant relationship was found between measures of alcohol use and future orientation in clinical sample.

Alcohol outcome expectancies were related to measure of violence and neglect as well as alcohol use and problems (Tables 5, 7, & 9). Feeling good expectancy was significantly correlated with perceived violence in adolescents. In undergraduate students, history of both neglect and violence was related to dealing with difficulties expectancies, whereas only history of violence was significantly related to dealing with difficulties expectancy in clinical sample. The desire to immediate reduction in stress, and temporarily forget about the problems can be a strong reason for alcohol and drug use (Simantov, Schoen, & Klein, 2000). The reinforcing effects of alcohol use to reduce negative effects of stress make these

individuals more vulnerable to experimental substance abuse and later dependence in response to situational stress and negative emotions (Simantov et al., 2000).

With regards to alcohol outcome expectancies, all measures of alcohol use were positively related to alcohol outcome expectancy liking in adolescents (Tables 5). Feeling good expectancy was positively related to recent and higher problematic alcohol use. Also adolescents who expect to feel better from drinking were more likely to use alcohol recently and frequently. Both feeling bad and worse outcome expectancies were negatively correlated with recent and problematic alcohol use in this group.

In undergraduate students, all measures of alcohol use were positively related to alcohol outcome expectancy liking, and alcohol enjoying things expectancy, and negatively to alcohol impairment expectancy (Tables 7). In addition, alcohol enhancing experiences and letting go expectancies were positively correlated to recency and quantity of use, and problematic alcohol use. Alcohol enhancing experiences expectancy was also positively related to frequency of use. Only the relationship between alcohol dealing with difficulties expectancy and problematic alcohol use was significantly positive in this group. In the clinical sample, recency of alcohol use was positively related to alcohol enjoying things and enhancing experiences expectancies (Tables 9). In contrast to the adolescents and undergraduates, none of the explicit expectancy measures were associated with problematic alcohol use in this group.

The alcohol outcome expectancy findings with respect to adolescents and undergraduates are highly consistent with previous studies. Outcome expectancies are powerful correlates of drug and alcohol abuse (Brown, Christiansen, & Goldman, 1987; Cohen & Fromme, 2002; Cohen et al., 2006; Greenbaum et al., 2005). Our results were

similar to studies that showed alcohol expectancies predict the quantity of drinking (Chen, Grube, & Madden, 1994) among adolescents, and rates of alcohol use in college students and young adults (McCarthy et al., 2000). In addition, expectancies were more strongly connected to quantity than frequency of drinking (i.e. number of drinking days in the past 30). The most important function of alcohol outcome expectancies may be their prediction of changes in drinking behaviours and the development of problems caused by alcohol use (Smith et al., 1995), and also the alcohol dependence symptoms (Kilbey et al., 1998). For example, outcome expectancies related to enhanced social behaviours and improvement of cognitive and motor functioning are good predictors of adolescents' problematic drinking measured 1 year later (Christiansen, Smith, Roehling, & Goldman, 1989). Expectancies also predict the growth in the quantity and frequency of drinking, even when demographic factors such as gender and age are considered (Fulton et al., 2012).

5.1.5. Bivariate Relationship among Maltreatment, Alcohol Use, and System 1 Processes

I did not find any significant relationship between maltreatment and automatic alcohol associations in adolescents (Tables 5). However, in undergraduate students, perceived violence was positively correlated with alcohol coping associations (Tables 7). The lack of relationship between maltreatment and automatic alcohol associations in adolescents might be due to the fact that they have not experienced the effects of drinking as much as undergraduate students and clinical sample yet. Maltreated adolescents may shape similar alcohol coping associations later as adults. Alcohol-related context can trigger the activation of system 1 processes, including automatic associations about the effect of alcohol use, such as relieving negative affect, and increases the likelihood of using alcohol (Hogarth, Dickinson, Wright,

Kouvaraki, & Duka, 2007; Krank et al., 2005; Stacy et al., 1996; Stacy, 1997; Wiers et al., 2002).

The present findings are consistent with previous results using that memory associations assessed with measures similar to those used here. Research has confirmed that these memory associations correlate with (Krank & Wall, 2006) and predict (Krank et al., 2011; Krank et al., 2010) transitions to substance use in youth. In addition, the self-coding of the memory associations that we used has been shown to strongly predict the level of alcohol and marijuana use both in adolescents (Frigon & Krank, 2009) and college students (Krank, Schoenfeld, & Frigon, 2010). Self-coding also improves the prediction of alcohol and marijuana use over the traditional coding methods (Frigon & Krank, 2009; Krank, Schoenfeld, & Frigon, 2010).

Dysfunctional memory associations can make individuals susceptible to excessive drinking in response to contextual and situational stress, and lead to the development of strong associations between alcohol and the situational contexts (Krank et al., 2005; Milton & Everitt, 2012; Ohannessian & Hesselbrock, 2007; Torregrossa, Corlett, & Taylor, 2011), and result in increased rate of retrieval of alcohol associations in the presence of alcohol-related contextual cues. However, studies have indicated that alcohol and drug-related associations may already be shaped before the initiation of alcohol and drug use (Cameron, Stritzke, & Durkin, 2003; Wiers et al., 2000). The results of this dissertation are in line with these finding, as we found strong relationship between alcohol automatic associations and alcohol use in adolescents. Recency of alcohol use was positively related to all alcohol associations (word, celebrate, social, and coping). Frequency of alcohol use, and problematic alcohol use was related to all alcohol associations, except alcohol word associations in adolescents. In

addition, quantity of alcohol use was positively related to the automatic alcohol word and celebrate associations in this group. Also, among undergraduate students, all alcohol associations (word, sex, celebrate, social, and coping) were significantly and positively associated with all measures of alcohol use.

Negative associations with alcohol use are common in children (Wiers et al., 1998), and more positive and arousal associations develop later next to the negative associations; this can result in an implicit ambivalence (De Houwer et al., 2004; Krank & Goldstein, 2006; Wiers & Stacy, 2006; Wilson et al., 2000). Therefore, using alcohol can be connected with both positive and negative automatic associations (De Houwer, 2006; de Jong et al., 2007).

In the clinical sample, perceived violence was positively correlated with sex, celebrate, and social alcohol associations (Tables 9). In addition, problematic alcohol use was positively correlated to celebrate, social, and coping associations, whereas recency of use was related with word associations and frequency of use was correlated to sex associations. Because of the small number of participants who completed questions related to alcohol sex, celebrate, social, and coping associations, results related to these variables should be treated with caution; however, it is notable to consider the reason participants of this group were hesitant to answer these questions. Most participants reported that these questions are very triggering for them, and may lead them to think of alcohol use. This finding implied that although participants did not answer to the questions, alcohol automatic association questionnaire is a valid measure to assess system 1 processes related to substance use.

It is also important to note that, even with the few participants who agreed to respond to these triggers, the relationships with alcohol use and problems were significant and very strong. These observations contrast sharply with the absence of any strong relationship

between drinking and outcome expectancies or outcome expectancy liking in the clinical sample. In both the undergraduate and adolescent samples, outcome expectancies and outcome expectancy liking variables were much stronger predictors of alcohol use. This difference supports the incentive sensitization hypothesis (Robinson & Berridge, 1993; Robinson & Berridge, 2003), whereby “liking” becomes less influential during the course of addiction where the more automatic and implicit associations become more influential. Although in need of further study given the sampling limitations here, the relationships found in the clinical sample suggest that the spontaneous and implicit behavioural responses to potential triggering phrases may effectively measure some of the “wanting” motivations proposed by incentive sensitization theory.

The findings with adolescents and undergraduates also make sense with the interpretation of the explicit expectancy and implicit associations reflecting ‘liking’ and ‘wanting’ respectively. In these groups, lower levels of addictive use would be consistent with a mixture of more explicit (liking) motivations and implicit (wanting) motivations. This translation of explicit expectancies and implicit associations in accordance with incentive sensitization has been suggested by Wiers and colleagues (Wiers & Stacy, 2006; Wiers et al., 2007).

5.2. Perceived Maltreatment and Systems 2 Processes

First, I hypothesized that perceived maltreatment including neglect and violence is associated with impairment in system 2 processes. Particularly, I hypothesized that maltreated ones would reveal lower levels of future orientation. I also hypothesized that they would expect more positive and coping outcomes from drinking alcohol. The results of the current study generally confirmed these hypotheses. When two forms of maltreatment were

considered together, perceived neglect was significantly associated with lower scores of total future orientation, and two of the subscales, including planning ahead, and anticipation of future consequences (Tables 10). In undergraduate students, both neglect and violence were significantly associated with lower total future orientation, and anticipation of future consequences (Tables 11). However, these relationships were stronger for neglect. Also, neglect was significantly correlated with lower time perspective and planning ahead in this group. Perceived violence had a negative effect on the anticipation of future consequences in clinical sample (Tables 12). These findings are consistent with the suggestions of other researchers that exposure to maltreatment is linked to difficulty in abstract reasoning (Beers & De Bellis, 2002; Mezzacappa et al., 2001; Nolin & Ethier, 2007), problem solving and planning (Nolin & Ethier, 2007), response inhibition and inhibitory control (DePrince et al., 2009; Navalta et al., 2006; Pollak et al., 2010), which are related to consideration of future consequences (Joireman et al., 2006).

Consideration of future consequences, and as measures in my studies, future orientation, is predictive of a range of behaviours related to self-control, including substance abuse (Joireman et al., 2006). It has been found that individuals with high consideration of future consequences show higher self-control, and those with less concern about future consequences indicate lower self-control (Joireman et al., 2003). These findings also highlight the importance of neglect, and its adverse effects on reasoning systems. As discussed before, neglect is usually a chronic situation that can result in similar severe consequences as sexual and physical abuse (Hart et al., 1998; Trickett & McBride-Chang, 1995), and strongly influence the normal development, and in many cases is associated with even more severe

cognitive and intellectual deficits compared to physical and sexual abuse (Hildyard & Wolfe, 2002).

When two forms of maltreatment were considered together, the relationship between violence and alcohol feeling good was significant in adolescents. In both undergraduate students and clinical patients, those reported higher levels of violence were more likely to drink alcohol to deal with difficulties. Also, neglected individuals expected less enjoyment and enhancement of experiences from drinking alcohol in undergraduate student group (however these models were not significant).

These findings can be explained by assuming a relationship between child maltreatment and emotion dysregulation (e.g., Briere & Rickards, 2007; Shipman, Zeman, Penza, & Champion, 2000; Shipman, Edwards, Brown, Swisher, & Jennings, 2005). Some theories such as stress response theories (Foster & Brooks-Gunn, 2009) suggested that those reported perceived violence use alcohol and drugs as coping mechanisms and to relieve negative emotions such as anxiety, low mood and anger. Hopelessness, depression, reduced life purpose, and other emotional symptoms, which are associated with the experience of violence, can make these individuals vulnerable to further alcohol and drug use to alleviate the negative affect (Kilpatrick et al., 2003; O'Keefe, 1997). Using to cope in addition to the problems in emotional regulation, and impaired self-control and reasoning, which is common in those exposed to violence, increases the risk of alcohol and drug use (Sullivan et al., 2007). In addition, the relationship between neglect and less alcohol enjoyment and enhancement expectancies in undergraduate students, and more alcohol letting go expectancy in clinical sample can be potential indicators of depressive symptoms which is common in adults who were neglected in childhood (Brensilver et al., 2011; Laucht et al., 2013).

5.3. Perceived Maltreatment and Systems 1 Processes

The second hypothesis suggested there would be a relationship between maltreatment (neglect and violence) and system 1 processes (automatic memory associations). It was hypothesized that maltreated individuals would indicate more alcohol automatic coping associations. When the two forms of maltreatment were considered here, no significant relationship was found between perceived neglect and violence and automatic memory associations in adolescents (see Tables 13). The effect of maltreatment on different memory systems depends on the developmental course and process in which they exposed to maltreatment (Chaiken & Trope, 1999; Evans, & Coventry, 2006; Haeffel et al., 2007). The lack of relationship between maltreatment and automatic alcohol associations in this group might be due to the fact that adolescents have not experienced the effects of drinking as much as undergraduate students and clinical sample yet. Maltreated adolescents may shape similar alcohol coping associations later as adults. Nonetheless, I did not find any other study in this area, and thus these findings in adolescents are not clearly explained within existing literature.

For undergraduate students, higher perceived violence was related to more, and neglect was correlated with less alcohol word associations (Tables 13). As we discussed before, the hippocampus (which plays a key role in memory and learning) can be altered because of the high levels of released GCs triggered by childhood maltreatment (Sapolsky, Uno, Rebert, & Finch, 1990; Uno, Tarara, Else, Suleman, & Sapolsky, 1989). These alterations may lead to increased consolidation of memory traces and continuation of intrusive memories (Bremner et al., 1995; Pitman et al., 1993). The specific details and conditions (context) that were encoded at the timing of learning can lead to later retrieval of those memories in the presence of similar retrieval context. The higher retrieval of alcohol associations from ambiguous words in those

who experienced violence is consistent with our previous results that indicated a positive correlation between violence and problematic alcohol use in undergraduate students, suggesting a higher experience of alcohol use in this group. In contrast, neglect was not related to any measure of alcohol use in undergraduate student, which can be an indication of less experience of alcohol use in this group. Also, perceived violence was positively correlated with alcohol coping associations. The positive relationship between violence and alcohol coping associations, as observed previously when considered separate from neglect, and in the model predicting the effect of maltreatment on alcohol coping associations is consistent with studies that indicated current or former drinkers with histories of maltreatment are more likely to report drinking to cope with problems compared to others (Rothman et al., 2008). This previous study is also in line with our finding that both violence and alcohol coping associations were significantly and positively correlated with problematic alcohol use in this group. Perceived neglect has also been linked to problems in coping and emotion regulation (Pollak et al., 2000), however, we did not find a significant relationship between neglect and alcohol coping associations in our study groups.

In the clinical sample group, the model predicting the effect of maltreatment on alcohol sex associations indicated a positive correlation with violence, and a negative correlation with neglect (Tables 13). Also, violence was positively correlated with alcohol social and celebrate associations. Because of the small number of participants who completed questions related to alcohol sex, celebrate, social and coping associations, results related to these variables should be treated with caution. However, it is important to mention that in this group, maltreatment was not significantly related to alcohol word associations.

5.4. Perceived Maltreatment and Perceived Stress

Hypothesis 3 involved testing the relationship between maltreatment (neglect and violence) and current perceived stress. It was hypothesized that perceived maltreatment increases the risk of current perceived stress. Our results strongly supported this hypothesis (Tables 14). Only perceived violence was not significantly related to perceived stress in the clinical sample. All other relationships were significant. Higher scores in perceived stress scale represent a higher level of current stress level and stress appraisal. It also reflects that they perceive their lives as uncontrollable, unpredictable, and overloaded. This finding is in line with previous studies that indicated those exposed to maltreatment are at higher risk of continuing exposure to stressful and adverse events and circumstances (Pearlin, 1989), and greater number of life adverse events and chronic stressors experienced (Hazel et al., 2008; Turner & Butler, 2003; Turner & Turner, 2005) into adulthood. Consistent with our findings in adolescents, previous exposure to maltreatment can also lead to continued stress and life adverse exposures in elementary and middle school students (Cole et al., 2006).

The effect of neglect seems more general across groups and also more long-lasting. It has been suggested that experience of neglect may cause negative impact on normal development through increasing the stress level over time or by triggering the expression of pre-existing genetic susceptibilities (Shonkoff et al., 2009) which can result in long-lasting changes in normal regulation of the stress system and hypothalamic–pituitary–adrenal (HPA) axis (Gerra et al., 2009) and alterations in dopaminergic reward pathways (Andersen & Teicher, 2009) and brain regions, such as reduced Corpus Callosum area (Teicher et al., 2004). Our findings are in line with previous research that indicated neglect is linked to elevated symptoms of anxiety and depression in early adolescence (Johnson et al., 2000), greater current psychological distress, and lower cohesion and adaptability in undergraduate

students (Wark et al., 2003), and adulthood deficits in recognizing positive pictures (Young & Widom, 2014). Such experiences might also increase the vulnerability to alcohol and drug abuse to decrease negative affect, reduce stress and cope with problems (Jones-Webb et al., 1996; Leigh, 1989).

5.5. Perceived Maltreatment and Risky Personality Characteristics

Hypothesis 4 examined the effect of maltreatment (neglect and violence) on risky personality characteristics. It was hypothesized that maltreatment is associated with risky personality characteristics, specifically sensation seeking and impulsivity. When two forms of maltreatment were considered together, no significant relationship was found between maltreatment and anxiety sensitivity in any of the groups (Tables 15). Nonetheless, in all three groups, perceived neglect was associated with higher levels of negative thinking, whereas the relationship between violence and negative thinking was only significant in the clinical sample. The finding that neglected individuals are more likely to experience negative thinking and hopelessness is consistent with other studies that indicated childhood neglect is linked to higher hopelessness (Crittenden, 1992), and other related factors to negative thinking, including more automatic self-depression and automatic self-anxiety associations (van Harmelen et al., 2010), increased depressive symptoms (Brensilver et al., 2011; Laucht et al., 2013), more anxious and insecure attachments (Crittenden & Ainsworth, 1989), higher rates of internalizing problems (Manly et al., 2001), and lower self-esteem and higher negative affect (Erickson et al., 1989).

In addition, those who experienced violence were more likely to report higher levels of impulsivity in all three groups (Tables 16), whereas the relationship between neglect and impulsivity was only significant in undergraduate students. Similar results were observed in

the models tested the effect of maltreatment on sensation seeking in adolescents and undergraduate students, in that perceived violence was related to higher level of sensation seeking; however, neglected individuals had lower levels of sensation seeking. Maltreatment did not have any significant effect on sensation seeking in clinical sample. These findings are in line with the suggestions of researchers that separated disinhibitory control into two different personality dimensions: Sensation Seeking and Impulsivity (Lejuez et al., 2005). It has been indicated that a history of maltreatment is associated with impairments in inhibitory control in childhood (DePrince et al., 2009; Mezzacappa et al., 2001; Pollak et al., 2010), adolescence (Mueller et al., 2010), and adulthood (Navalta et al., 2006). Exposure to maltreatment has been also related to impulsivity directly. For example, a longitudinal study by Bailey and McCloskey (2005) showed that impulsivity mediated the relationship between sexual abuse and substance use regardless of demographic characteristics, parenting styles and psychopathology. Neglected individuals were more likely to show less sensation seeking in adolescents and undergraduate students groups. To our knowledge, it is the first study that assessed the direct effect of neglect on sensation seeking, and therefore, it is hard to draw a conclusion from the current findings. However, we suggest that lower scores in sensation seeking, in addition to the high levels of negative thinking and great degree of current perceived stress in neglected individuals may reflect a pattern of internalizing problems, such as depressive symptoms, rather than externalizing problems, such as problematic alcohol use. This conclusion is consistent with our other finding that neglect was not related to any measure of alcohol use in any group.

5.6. Assessing Mediators in the Relationship between Perceived Maltreatment and Alcohol Use

Hypothesis 4 involved examining the hypothesis that system 1 and system 2 processes, perceived stress, and risky personality characteristics mediate the relationship between perceived maltreatment and problematic alcohol use. Particularly, I hypothesized that perceived maltreatment would increase the risk of alcohol use through higher impulsivity and sensation seeking (risky personality characteristics), higher levels of current perceived stress, and more positive and coping alcohol associations and expectancies. I only conducted the indirect analysis between violence and recency of alcohol use and problematic alcohol use (AUDIT) in adolescents, and violence and frequency of alcohol use and problematic alcohol use in undergraduate students, as no other significant relationships between maltreatment and measures of alcohol use was found. In addition, no shared significant variables were found between neglect and frequency of alcohol use in adolescents; therefore, I did not conduct any indirect analysis for this relationship. System 2 processes, including alcohol feeling good expectancies, total future orientation, and risky personality characteristics, including impulsivity and sensation seeking, were separately considered as the mediators for analysis, because these were the only variables significantly correlated with both violence (independent variable) and recency of alcohol use and problematic alcohol use (dependent variable) in adolescents.

The current findings partially supported the hypotheses in adolescents. With regards to the relationship between violence and recency of alcohol use, alcohol feeling good expectancy, and both sensation seeking and impulsivity mediated this relationship (Tables 16). None of the mediators emerged significant in the relationship between violence and

problematic alcohol use (Tables 17). Only when taken together, total mediating effect of system 2 processes, including future orientation and alcohol feeling good expectancy, was significant in the relationship between violence and AUDIT. As mentioned before, adolescents have less opportunity to access alcohol legally which can considerably restrict their frequent use or the quantity of use; more recent alcohol use represents risky drinking in this group. Therefore, it is not surprising that the relationship between violence and recency of use was stronger and clearer in this group. Exposure to stress and maltreatment during childhood may cause permanent alterations in brain structure and function and also adversely influence the brain reactivity to stress (Hart & Rubia, 2012; Teicher, 1989). Adolescence is a critical period in which the long-lasting consequences of maltreatment come to light. In addition, this age is associated with changes in sex steroid levels and consequently increased HPA axis activity (McCormick & Mathews, 2007).

Our finding that those who experienced violence were more likely to expect feeling good from drinking, which leads to more recent alcohol use is consistent with studies that demonstrated individuals with histories of maltreatment are more likely to expect positive effects from alcohol use, and drink to decrease negative affect, and cope with problems (Goldstein et al., 2010; Rothman et al., 2008). The reinforcing effects of alcohol can lead to shaping positive and coping expectancies that encourage more drinking. Positive outcome expectancies about drinking predict the rates of alcohol use in college students and young adults (McCarthy et al., 2000).

On the other hand, the findings that perceived violence is predictive of higher scores in risky personality characteristics, including sensation seeking and impulsivity, are in line with those studies that childhood maltreatment is associated with impairments in inhibitory control

in adolescence (Mueller et al., 2010). Other studies indicated that impulsivity mediated the relationship between sexual abuse and substance use (Bailey & McCloskey, 2005) over an 8-years follow-up, regardless of demographic characteristics, parenting styles, and psychopathology. Other researchers also indicated the mediating effect of sensation seeking in the relationship between maltreatment and other risky behaviours. For example, Bornovalova, Gwadz, Kahler, Aklin, and Lejuez (2008) showed that both seeking and tendency to risk-taking behaviours mediated the relationship between abuse and HIV-related risk behaviours in adolescents with a stronger effect for sensation seeking. These findings have been supported in longitudinal studies of children with parental substance use. For example, Wong and colleagues (2006) compared children of alcoholics with controls in the impact of patterns of impulsivity on later substance use at three intervals starting at 2 years old till they were 17 years old. Results indicated that slower growth in behavioural inhibition significantly predicts earlier age of onset of drug use and elevates rate of drug-related problems in young adulthood. This effect remained even after controlling for internalizing/externalizing variables and parental alcoholism. Poor response inhibition score at baseline also predicts the future rate of alcohol and illicit drug use in a large group of adolescents with paternal alcoholism compared with controls (Nigg et al., 2006). In a longitudinal design, Fisher and colleagues (2011) have shown that both parental substance use and exposure to early adversity predict behavioural disinhibition in adolescence. Following this study, Lester and colleagues (2012) assessed the impact of behavioural disinhibition in childhood on the beginning of substance use in adolescence. Results showed that early behavioural disinhibition predicts initiation of tobacco, alcohol, and other substance use, except marijuana.

In undergraduate students, alcohol coping associations (system 1), total future orientation (system 2), and sensation seeking (risk personality characteristics) mediated the relationship between perceived violence and frequency of alcohol use (Tables 18). On the other hand, alcohol dealing with difficulties expectancy and total future orientation (system 2), alcohol coping associations (system 1), sensation seeking and impulsivity (risk personality characteristics), and current perceived stress were significantly correlated to both violence and problematic alcohol use and thus all entered separately as mediators. All mediating variables emerged as significant between violence and problematic drinking, except alcohol dealing with difficulties expectancy (Tables 19).

The mediating effect of alcohol coping associations between violence and both frequency of alcohol use and problematic alcohol use is in line with stress response theories (Foster & Brooks-Gunn, 2009) suggesting that those who experienced violence use alcohol and drugs as coping mechanisms and to relieve negative emotions such as anxiety, low mood and anger. These theories are in line with findings from studies that indicated perceived violence is associated with hopelessness, depression, reduced life purpose, and other emotional symptoms, which may make these individuals vulnerable to further alcohol and drug use to alleviate the negative affect (Kilpatrick et al., 2003; O'Keefe, 1997). Our results suggest that both frequency of drinking and problematic alcohol use reported by individuals with higher perceived violence is at least partially explained by drinking to cope, problems with future orientation, and increased impulsivity. Also, those with greater history of violence reported higher sensation seeking that resulted in more problematic alcohol use in this group. This is partly in line with previous finding that showed using to cope in addition to the

problems in emotional regulation and impaired self-control, which is common in those exposed to violence, increases the risk of substance use (Sullivan et al., 2007).

5.7. Perceived Maltreatment, Dual Process Model, and Alcohol Use

I hypothesized that maltreated individuals have difficulty in system 2 processes, and are more likely to shape coping automatic association in relation to drinking alcohol, and that this cognitive pathway results in higher rates of problematic drinking. For this hypothesis, I examined the underlying structures from violence to frequency of alcohol use, and problematic alcohol use in undergraduate students, as no other significant relationship was found between maltreatment and alcohol use that was mediated by both system 1 and system 2 processes in our analysis. These findings indicated that the best fitting model is the one in which violence is associated with problematic alcohol use via alcohol coping associations and future orientation (Tables 20). Also, as hypothesized, those who experienced higher levels of violence have difficulty in system 2 processes, and were more likely to shape coping automatic association in relation to drinking alcohol, and that this cognitive pathway resulted in higher rates of problematic alcohol use.

As discussed in the previous sections, childhood maltreatment leads to the alteration of brain regions and functions (Teicher et al., 2002; Teicher et al., 2003) underlying system 2 processes, such as executive functions (Majer et al., 2010; McDermott et al., 2012), behavioural control (Rosenman & Rodgers, 2006; Rutter, 2002), and reward processing (Dillon et al., 2009; Guyer et al., 2006). In addition, those who experienced violence in this group were more likely to expect that alcohol help them to deal with difficulties. This is in line with previous studies that showed individuals with histories of maltreatment are more likely to expect positive effects from alcohol use, and drink to decrease negative affect, and

cope with problems (Goldstein et al., 2010; Rothman et al., 2008). The reinforcing effects of alcohol can lead to shaping memory associations and expectancies that encourage substance use. Memory associations and expectancies about the effects of substance use are known as strong predictors of problematic drinking in both cross-sectional and longitudinal studies (Frigon & Krank, 2009; Krank et al., 2010; Wiers & Stacy, 2006; Wiers et al., 2002).

In the present study, we also showed that undergraduate students who experienced more violence suffered from higher levels of current perceived stress. We suggest that the higher levels of stress and presence of stress-related cues can facilitate the automatic and non-conscious retrieval of memory associations related to the coping effect of alcohol. Memory associations that relate alcohol use to coping effects can override the reasoning system that represents the logical and rational knowledge about the effects of problematic alcohol use in the future. Deficits in future orientation, which was observed in these individuals, in addition to dysfunctional memory associations can make them susceptible to excessive drinking in response to contextual and situational stress. This conclusion is in line with dual system theories that propose dual processes (procedural vs. competence) for explaining adult judgment, reasoning, and decision making (Berry & Dienes, 1993; Gawronski & Bodenhausen, 2006; Nelson, 1995; Ricco & Overton, 2011; Sun et al., 2005; Wiers & Stacy, 2006). These processes may actively lead to changes in motives for drinking alcohol (Cooper et al., 1995; Grant et al., 2007; Kuntsche et al., 2006; Prescott et al., 2004).

5.8. Sex Differences

I used a sex lens through the analysis, where I hypothesized that sex differences influence the type of maltreatment experienced, and also moderate the effect of maltreatment on perceived stress, dual processes, risky personality characteristics, and alcohol use. In the

following sections, I first discuss the sex differences in perceived maltreatment and other variables in three groups, and then I discuss the effect of sex on the relationship between maltreatment and other variables, including perceived stress, system 1 and 2 processes, risky personality characteristics, and alcohol use in three groups of participants.

5.8.1. Descriptive Statistics Based on Sex Differences

Most sex differences were found in undergraduate students following by adolescents. Results of clinical patients indicated no significant difference between males and females in perceived maltreatment, perceived stress, system 1 and 2 processes, risky personality characteristics, and alcohol use in this group (Tables 23).

In adolescents, females reported higher levels of neglect, current perceived stress and negative thinking than males, whereas males scored slightly higher in total future orientation scores than females (Tables 21). These findings are consistent with sex differences that were reported in the rate of depressive symptoms in adolescence, in that girls were more than twice as boys to report depressive symptoms in mid-adolescence (Hankin, 2008). Pubertal processes may increase the risk of depressive symptoms in girls during early adolescence through the increase in pubertal hormones, and physical changes associated with puberty. Increase in pubertal hormones, such as adrenal androgens, progesterone, and estrogen has been directly linked to the emergence of girls' depressive symptoms in early adolescence (Angold & Costello, 2006). In addition, the physical changes resulted from puberty, such as increased body mass index, can lead to depressive symptoms through negative psychological consequences, such as reduced body satisfaction in girls (Compian, Gowen, & Hayward, 2009). Cognitive abilities for abstract thinking and operational thought (Cole et al., 2008; Gibb & Alloy, 2006) also develop during this period, and exposure to stress can make girls

vulnerable to negative cognitive style, including the tendency to negative self-associations such as negative self-attitudes and low self-worth (Abramson et al., 1989). These changes in cognitive style would explain our findings that girls suffer more from current perceived stress, which is indicative of higher levels of stress, and lower perception of control over it.

In undergraduate students, males reported higher levels of both neglect and violence, higher degrees of negative thinking, impulsivity and sensation seeking, greater alcohol outcome expectancy liking, more alcohol coping automatic associations, lower score in total future orientation and two future orientation subscales (planning ahead, and anticipation of future consequences), higher frequency and quantity of alcohol use and problematic alcohol use, compared to females (Tables 22). On the other hand, females reported higher levels of perceived stress, anxiety sensitivity, and alcohol letting go expectancies, than males. Although males generally experience more violence during childhood (Acierno et al., 2000; Gwadz et al., 2007), and in their lives (Stewart et al., 2002), I could not find other studies that show higher rates of neglect in males than females.

As discussed above, during adolescence, girls are twice as likely as boys to report depressive symptoms (Hankin, 2008). This pattern continues into adulthood. These findings are consistent with, but also contrast with, the current literature on sex differences. Women are much more likely than men to be depressed (Nolen-Hoeksema, 2001). Higher levels of negative thinking are inconsistent with previous findings. Consistent with the literature, higher scores on the perceived stress scale were reported in females compared to their male peers in university students in other studies (e.g., Gallagher et al., 2014; Hirsch, Do, Hollenbach, Manoguerra, & Adler, 2009; Marshall, Allison, Nykamp, & Lanke, 2008). Nonetheless, men tend to engage in more risky behaviours, such as heavy drinking, smoking, illicit drug use,

than their female counterparts (Courtenay, 2000). Our sex difference results in undergraduate students are also consistent with previous studies that indicated a higher rate of sensation seeking and alcohol use, and more negative consequences of alcohol consumption in males compare to females (Jones, Chryssanthakis, & Groom, 2014). In a study by Rahmani and Lavasani (2012) on personality characteristics of 177 undergraduate students, males showed higher sensation seeking, adventure seeking, disinhibition and boredom susceptibility than female students, whereas females indicated higher scores on openness to experience and agreeableness compared with boys. Consistent with Canadian Alcohol and Drug Use Monitoring Survey (CADUMS; Health Canada, 2012), males in our sample were more likely to report higher frequency and quantity of alcohol use, and receive hazardous alcohol use scores in AUDIT (problematic alcohol use).

5.8.2. Interacting Effect of Maltreatment and Sex

Results from testing the interacting effect of sex and maltreatment on perceived stress, risky personality characteristics, dual system processes, and alcohol use (dependent variables) revealed two noticeable findings. First, sex moderated the effect of maltreatment on dependent variables in females and males. In general, controlling for the moderating effects of sex increased the likelihood of a pattern similar to internalizing problems in neglected males and females exposed to violence. In contrast, externalizing problems and impaired reasoning were increased in neglected females and males exposed to violence by controlling for the moderating effects of sex. For example, our previous results indicated that perceived neglect increases the current perceived stress and negative thinking, and reduces scores in sensation seeking, future orientation, planning ahead and anticipation of future consequences in adolescents; however, by controlling for the moderating effects of sex, the effect of neglect on

receiving lower scores in sensation seeking was only significant in neglected males, whereas only neglected females indicated a significant lower score in future orientation and anticipation of future consequences. Also, neglected males showed significant lower anxiety sensitivity that was not present when both sexes considered together. The effect of neglect on perceived stress disappeared after controlling for the moderating effects of sex on these interactions. In addition, perceived violence was associated with increased perceived stress, impulsivity, sensation seeking, and alcohol feeling good expectancies when both sexes were considered together, but only females who experienced violence indicated significant higher perceived stress and alcohol feeling good expectancies in this group. In addition, perceived violence significantly increased negative thinking in females; a finding that was not present when both sexes were considered together.

Despite these differences, some adverse outcomes of maltreatment remained significant in both male and female adolescents: 1) high impulsivity and sensation seeking in those who experienced violence, and 2) increased negative thinking and decreased planning ahead in neglected males and females (Tables 24). Similar pattern was found in undergraduate students and clinical sample (Tables 25 & 26), in that controlling for the moderating effects of sex increased the likelihood of more externalizing problems and impaired reasoning in neglected females and males who experienced violence, and internalizing problems in neglected males and females who experienced violence.

The second observation in sex differences found was in the pattern of the relationship between maltreatment and dependent variables. In adolescents, neglected males were more likely to experience negative thinking, and receive lower scores in sensation seeking and planning ahead than neglected females, whereas neglected females indicated lower scores in

total future orientation than males. Males who experienced violence were more likely to be impulsive than similar females, whereas females who experienced violence were more likely to report higher levels of perceived stress, more alcohol feeling good expectancy, and more recent drinking than similar males. In undergraduate students, neglected males were more likely to report higher level of negative thinking, lower levels of anxiety sensitivity, and less alcohol word associations, compared with neglected females. However, neglected females were more likely to report higher levels of perceived stress, anxiety sensitivity and impulsivity, and lower scores in total future orientation, and its subscales, time perspective and anticipation of future consequences than neglected males. On the other hand, males who experienced violence were more likely to report higher impulsivity and sensation seeking, lower total future orientation score and anticipation of future consequences, more frequency and quantity of use and more problematic alcohol use than similar females. Alcohol dealing with difficulties expectancy was significantly higher in females who experienced violence compared to males with such experiences. In the clinical sample, neglected males were more likely to report higher perceived stress than females, whereas neglected females received higher scores in impulsivity, and were lower in sensation seeking than neglected males. Males who experienced violence reported higher negative thinking, and impulsivity, and lower sensation seeking, and received lower scores in anticipation of future consequences than females.

Also, sex differences for the clinical sample were found in the model predicting interacting effect of maltreatment and sex on alcohol sex associations, and violence and sex on alcohol social associations; however, as mentioned before, because of the small number of

participants who completed questions of automatic alcohol associations, results related to these variables should be viewed with caution.

A very limited number of studies have explored sex differences by the type and consequences of maltreatment. Our findings may reflect sex differences in the effects of maltreatment, including chronicity and pervasiveness, on later problems. Exposure to more chronic and pervasive type of maltreatment, such as neglect, may put males at risk of more internalizing problems, whereas neglect may increase the risk of externalizing problems and impaired reasoning in females. More incident-specific types of maltreatment, such as violence, might enhance the risk of more externalizing problems and impaired reasoning in males, whereas violence might result in more internalizing problems in females. These findings have been partially supported by previous studies. For example, the relationship between domestic violence and externalizing symptoms was significantly stronger for boys than for girls (Evans, Davies, & DiLillo, 2008; Wolfe, Crooks, Lee, McIntyre-Smith, & Jaffe, 2003). Other studies indicated that in response to domestic violence, girls were more likely to show internalizing behaviours, whereas boys tend to display more externalizing behaviours (e.g., Carlson, 1991; Stagg, Wills, & Howell, 1989; Yates, Dodds, Sroufe, & Egeland, 2003).

Our results, however, did not support those studies that indicated females are more prone to both internalizing and externalizing problems than males in response to family violence (Cummings, Pepler, & Moore, 1999; Sternberg, Lamb, & Dawud-Noursi, 1998). Nevertheless, other studies reported similar problems in males and females (Grych, Jouriles, Swank, McDonald, & Norwood, 2000; O'Keefe, 1994; Sternberg, Baradaran, Abbott, Lamb, & Guterma, 2006).

I could not find any study that examined the direct effects of neglect on internalizing/externalizing problems in males and females. Yet, neglect has been generally connected to the internalizing problems (Dubowitz, Papas, Black, & Starr, 2002; Valentino, Cicchetti, Rogosch, & Toth, 2008). There are studies that compared the effect of maltreatment characteristics on cortisol and dehydroepiandrosterone (DHEA) level in males and females. Cortisol and DHEA are two hormones produced in the adrenal glands in response to stress. In response to stress, elevated level of cortisol release has been linked to internalizing problems, whereas blunted and reduced cortisol level was associated with externalizing problems. Further analyses indicated that the relationship between enhanced cortisol release and internalizing problems is only significant in boys and not in girls (Hartman, Hermanns, de Jong, & Ormel, 2013). On the other hand, DHEA may help the body with better regulation and adaptation in response to high levels of cortisol (Charney, 2004). Lower levels of DHEA have been connected to major depression and other psychopathology (Goodyer, Park, Netherton, & Herbert, 2001). In a recent study (Doom, Cicchetti, Rogosch, & Dackis, 2013), children with histories of maltreatment were compared with each other for type, severity, chronicity, onset, and recency of maltreatment and with a non-maltreated group for cortisol and DHEA level. Results indicated that interactions between maltreatment pervasiveness and gender predicted diurnal cortisol, DHEA, and cortisol/DHEA ratio levels. Boys were more likely to show elevated daily cortisol levels compared to girls in the group with more pervasive maltreatment (i.e., more chronic, more severe, multiple types), whereas boys with less pervasive maltreatment showed lower levels of DHEA and higher cortisol/DHEA ratio levels than girls with similar experiences, boys with more pervasive maltreatment and nonmaltreated boys. In addition, girls who experienced less pervasive maltreatment indicated

higher cortisol levels than non-maltreated girls, and girls with more pervasive maltreatment (Doom et al., 2013).

These findings in addition to the other studies that indicated enhanced cortisol release is related to internalizing problems in males (Hartman et al., 2013) may explain why neglect, which is a pervasive maltreatment, puts males in higher risks of internalizing problems. In contrast, females seem to show hyperresponsivity to stress initially, and down-regulate cortisol response (hyporesponsivity) to more pervasive maltreatment and chronic stress over time (Doom et al., 2013; Juster et al., 2011). In addition, emotions such as shame, which is more common in maltreated females than males (Cicchetti & Valentino, 2006), have been related to cortisol hyperresponsivity to acute stress, and to cortisol hyporesponsivity to chronic stress (Miller, Chen, & Zhou, 2007). More detailed sex analysis is required to elucidate the impact of maltreatment characteristics, including type, severity, frequency, and chronicity of occurrence on later mental health and substance use in different populations.

5.9. Summary and Conclusion

The main purpose of this dissertation was to increase our understanding of how perceived neglect and violence influence vulnerability to alcohol use and problematic drinking in three high risk groups of participants, including adolescents, undergraduate students, and clinical patients under treatment for substance use disorders. It was expected that individuals with a history of maltreatment would report higher levels of current perceived stress, more risky personality characteristics (particularly impulsivity, and sensation seeking), lower future orientation, more positive and coping alcohol outcome expectancies, and more automatic coping alcohol associations, and consequently these characteristics make them vulnerable to risky and problematic alcohol use. The present study also considered whether sex differences

impact the relationship between maltreatment and dual process systems, risky personality characteristics, and current perceived stress, and alcohol use.

Perceived neglect only increased the frequency of alcohol use in adolescents, whereas violence increased the likelihood of recent alcohol use in adolescents, frequency of drinking in undergraduate students, and problematic alcohol use in both groups. When both neglect and violence considered together in the regression models, neglect emerged the most negative effect on current perceived stress and negative thinking in all groups. Neglected individuals also revealed a deficit in future orientation, and its subscales, and were more impulsive in adolescents and undergraduate students groups. Interestingly, neglect was associated with lower sensation seeking (e.g., novel, and intense experiences and the related excitement). Moreover, the high level of current perceived stress and negative thinking (i.e., hopelessness) suggested a pattern of depressive symptoms and internalizing problems. This effect is more prominent in maltreated undergraduate students who also indicated less alcohol enjoying things and enhancing experiences expectancies and less alcohol word automatic associations. Further analysis however indicated that this pattern was stronger for males than females. Females were more likely to indicate externalizing problems and impaired rational thinking (e.g., lower future orientation, more impulsivity).

Perceived violence on the other hand had the strongest effect on impulsivity in all groups. Also, in all three groups, those who experienced violence indicated higher levels of positive and coping alcohol expectancies (e.g., feeling good, dealing with problems). Violence also had a strong positive relationship with sensation seeking in adolescents and undergraduate students. Moreover, violence was associated with higher perceived stress in adolescents and undergraduate students, and lower anticipation of future consequences in

undergraduate students and clinical sample. Controlling for the moderating effects of sex differences, externalizing problems and impaired reasoning were higher in males who experienced violence, while females were more likely to indicate internalizing problems and depressive symptoms in response to violence in all three groups. In general across groups, the perceived neglect had similar adverse effects on adolescents and undergraduate students, while the pattern of effect for violence was more similar in undergraduate students and clinical sample.

In the analysis of indirect effects in adolescents, violence predicted recency of alcohol use through alcohol feeling good expectancy (system 2) and both sensation seeking and impulsivity (risk personality characteristics). In undergraduate students, violence predicted higher frequency of alcohol use and problematic alcohol use through alcohol coping associations (system 1), total future orientation (system 2), and sensation seeking (risky personality traits). Also impulsivity mediated the relationship between violence and problematic alcohol use in this group. In both groups, perceived violence had a profound effect on personality characteristics that includes acting without thinking (impulsivity) and desire for excitement (sensation seeking) increasing vulnerability to risky and problematic alcohol use. Perceived violence in these two groups seems to enhance drinking for positive feeling and to cope with problems. These associations are more explicit and directly expressed in adolescents and are mostly related to increasing positive mood. In young adults (undergraduate students), these associations were more automatic and unconscious, and directed to situations and emotional states that involve increasing the positive mood and relieving negative emotions such as anxiety, low mood, and anger. Furthermore, only in

undergraduate students who experienced violence, impaired future orientation increased the risk of more frequent and problematic alcohol use.

It is notable to mention the results of studies that show age-related effects on this relationship. Although exposure to maltreatment accelerates the initiation and rate of substance abuse in early adolescence, the rates of substance abuse decrease over time until grade 12 when maltreated adolescents do not differ with non-maltreated peers (Bensley, Spieker, Van Eenwyk, & Schoder, 1999). After a period of silence in late adolescence, those exposed to maltreatment show a dramatic spike in substance abuse in early adulthood (Andersen & Teicher, 2009; Shin, Miller, & Teicher, 2013). The similar adverse effects of maltreatment on adolescents and undergraduate students and the increased risk of problematic alcohol use emphasize the importance of prevention in adolescents and early interventions in young adults (undergraduate students) with a focus on the importance of considering maltreatment in these groups.

The strongest dual processes pathway that connected violence to problematic alcohol use was via alcohol coping association and future orientation in undergraduate students. Those who experienced higher levels of violence showed impaired future orientation (system 2), and were more likely to shape coping automatic association in relation to drinking alcohol (system 1), and that this cognitive pathway resulted in higher rates of problematic alcohol use.

There are a few things to note with regards to these results. First, adolescents have limited access to alcohol which might restrict their frequent use or the quantity of use in this period of life. However, in our adolescent sample, both girls and boys showed recent use of alcohol which might be more indicative of risky drinking in this group than heavy frequent

drinking compared to undergraduate students and clinical patients that have legal access to alcohol and can afford to buy it.

Second, I did not find any significant relationship between maltreatment and automatic alcohol associations in adolescents, and thus I did not do the SEM analysis for the pathway of dual process systems in this group. This was the main difference between adolescents and undergraduate students who experienced violence. I suggested that the lack of relationship between violence and automatic alcohol associations in adolescents might be due to the fact that they have not experienced the effects of drinking as much as undergraduate students yet, and may shape similar alcohol coping associations later as adults. These observations are consistent with theories of implicit cognition that posit the development of stronger behavioural associations as a direct consequence of drinking (Stacy et al., 1996; Stacy, 1997; Wiers & Stacy, 2006; Wiers et al., 2007). They are also consistent with incentive sensitization theories (Robinson & Berridge, 1993; Robinson & Berridge, 2003) based on the assumption (Wiers & Stacy, 2006; Wiers et al., 2007) that implicit behaviour associations are indicators of implicit “wanting” as opposed to explicit “liking.”

Third, due to the lack of a significant relationship between maltreatment and alcohol use, I did not do the mediating analysis (INDIRECT) and, consequently, SEM analysis in clinical patients. We did not control for comorbidities of current and lifetime psychiatric diagnoses for this dissertation, which might influence the results. Also, we assessed the clinical sample in a residential center, where they can stay for several months, and reporting alcohol and drug use during this time might result in expelling them from the centre. Therefore, they might underreport or misreport the rate of alcohol and alcohol-related problems during the time of stay in the centre, which could impact the results.

Fourth, almost all hypotheses were confirmed in undergraduate students. This group mostly represents early adulthood with 92% participants between 19 to 22 years old and only 4 participants aged above 30 years old. This period of life is known for the highest frequency, quantity and problematic alcohol use than any other age group (e.g., Adlaf et al., 2005; Borsari & Carey, 2005; Chan et al., 2007; Flight, 2007; Wechsler et al., 2002). In addition, the adverse effects of maltreatment may not appear until early adulthood (Chapple et al., 2005), particularly for substance use that dramatically increases at early adulthood (Andersen & Teicher, 2009; Shin et al., 2013). As a final point, this was a non-clinical group of participants with average IQ and above. They would be expected to provide more accurate responses on the survey tasks in comparison to clinical sample and even adolescents.

Finally, sex differences found in this dissertation are very important findings with regards to the effect of maltreatment. However, sex differences related to neglect are not as clearly explained within existing literature and theoretical frameworks.

In addition to examining a number of social, personality, and cognitive variables as possible mediators or moderators of maltreatment effects, the present study was unique in using a measure of maltreatment that was designed to be sensitive to many levels of neglect and violence experiences. Most previous studies have used measures of reportable maltreatment such as the CTQ. The measures of perceived neglect and violence used here were designed to be more general and non-reportable. These measures are practical in that they can be used in a general screening setting such as school-based surveys without generating ethical concerns around mandatory reporting or encouraging resistant and possibly deceptive responding. Moreover, these measures are expected to be more sensitive than scales designed to pick up severe maltreatment. Although these measures may serve as valuable

screening tools in detecting more serious maltreatment, they are also expected to pick up the lower level effects of violence and neglect on the development of alcohol use and problems. One of the key results of this thesis is to confirm the validity of these measures as predictors of alcohol use and problems in adolescent and undergraduate populations. In the following section, some clinical implications are suggested based on the current findings.

5.10. Clinical Implications

I suggest several clinical implications based on the findings in the current dissertation. Given the adverse effects of neglect and violence in all three groups of participants, prevention of maltreatment in the general population should be of a great importance. This requires educating anyone who works with children and adolescents (e.g., school personnel, physicians, counselors, criminal justice workers) about the multiple forms of neglect and violence in various contexts. In addition, multiple intervention programs should be considered for maltreated individuals at different levels, including those targeting individuals with high risk of violence and neglect, and for those focused on individuals who have been already victims of maltreatment. The first level is particularly important for adolescents because they are still living at home, which may be the source of stress and maltreatment. Long-term care and support, such as rehabilitation and counselling, should be considered for the victims to decrease the long-term dysfunctions related to maltreatment, and reduce their dysfunctional coping skills, such as alcohol use, and increase their positive coping skills (Najavits, 2007).

Second, the results of this dissertation suggest that risky and problematic alcohol use, and/or depressive symptoms in adolescents, undergraduate students and even clinical patients should draw attention to the screening for experiences of violence and neglect. Mental health care personnel who provide treatment for clients with alcohol and other drug problems, such

as psychiatrists and psychologists, should know that experience of maltreatment is very prevalent in this population. These experiences may influence the course of treatment and drop-out. Our results indicated that the perceived maltreatment is associated with high levels of current stress, increased risky personality characteristics (e.g., impulsivity, sensation seeking and negative thinking), impaired future orientation, and drinking alcohol to cope with negative affect and other problems and to deal with difficult things in life.

Clinicians should ensure that maltreated individuals receive adequate interventions to reduce the current stress and to cope positively with the stress and also the experience of maltreatment. They should help these clients to develop positive coping skills and reduce dysfunctional coping skills, such as alcohol and drug use. Cognitive-Behavioural therapy (CBT) with a focus on coping strategies to deal with negative affect and problems can help replacing the automatic memory associations and outcome expectancies that relate alcohol to coping and sedative effects (Magill & Ray, 2009). Research on maltreatment adolescents also indicated the positive effects of behavioural coping skills to reduce the likelihood of substance use in response to stress (Brady, Tschann, Pasch, Flores, & Ozer, 2009). CBT has been also effective in treatment of internalizing problems (Cohen, Mannarino, & Staron, 2006), which was very prevalent in some groups of maltreated individuals in the current dissertation. Maltreated individuals were more likely oriented to the immediate rather than the future, were unable to consider the longer term consequences of their actions and decisions, less capable to planning ahead and were more impulsive. Therefore, maltreated individuals with alcohol problems would benefit from interventions that enhance their rational thinking and behavioural control. In the case of violence, intervention programs that help children and adolescents to avoid violent situations and develop positive coping skills in response to stress

can significantly prevent the long-term negative outcomes (e.g., Promoting Alternative Thinking Strategies (PATHS); Greenberg, Kusche, & Mihalic, 1999; and Life Skills Training; Botvin, Griffin, & Nichols, 2006).

Finally, our results suggest that the impact of neglect and violence on men are equally harmful or even worse than women. However, previous studies are exclusively focused on treatment of neglected and abused women (e.g., Fallot & Harris, 2002; Messina, Grella, Cartier, & Torres, 2010; Zlotnick, Johnson, & Najavits, 2009). Yet, intervention programs targeting histories of maltreatment and trauma have received almost no attention in research with men (Pettus-Davis, 2014). Particularly, some sex differences were observed in the adverse effect of maltreatment on alcohol use and other variables which may be uniquely important to improve treatment outcome of maltreated males.

5.11. Limitations and Future Directions

Although our findings added to the literature by exploring the underlying structure of the relationship between experience of maltreatment and alcohol use, there are some cautions that limit the generalizability and interpretation of the present findings. First, the generalizability is somewhat limited; the data was collected from high school students in a small city, undergraduate students, and patients under treatment for comorbid psychiatry disorders. These samples may not generalize to other adolescents who live in a different socio-demographic situation, other populations in young adulthood, or other clinical samples of patients with substance use disorder.

Second, the present study is a cross-sectional study, and thus causality cannot be determined from this data. It is possible that unmeasured common factors may account for the findings. Moreover, the direction of the relationships cannot be determined in a cross-

sectional design. For example, it may be that violence or neglect is wholly or in part consequences of alcohol use. Future studies can benefit from longitudinal design for stronger inferences.

Third, because of the highly sensitive nature of reporting both maltreatment and substance abuse, they might have been underreported. This effect would be expected to be more noticeable for adolescents and patients under treatment. Adolescents may be concerned that their private thoughts, behaviours, and experiences, such as illegal drug abuse, underage drinking, and exposure to familial abuse and violence will be disclosed to others, specifically parents, teachers and friends, and result in a break in confidentiality and adverse consequences for them (Ford et al., 1997; Klein et al., 1999; Lothen-Kline et al., 2003; Reddy et al., 2002). However, there is evidence that adolescents' self-report information about illegal activities, such as drug use, is valid (Winters, Stinchfield, Henly, & Schwartz, 1990). Also, we assessed a clinical sample in a residential center, where they can stay for several months, and reporting alcohol and drug use during this time might have resulted in their expulsion from the centre. A promise to respect the confidentiality can increase the probability of decent disclosure of these information; however, in some cases, the promise of confidentiality might be breakable (e.g., mandatory reporting of abuse and neglect for adolescents).

Importantly in this regard, we used a measure of neglect and violence that consisted of non-reportable and more general items to be more sensitive to lower levels of exposure and increase the likelihood of honest disclosure. We also promised participants in both groups that their responses would not be linked to their identifying information. For the clinical sample, we assured participants that staff in the Burnaby centre, including doctors and nurses, would not have any access to the responses they provided for the study, and their responses would be

only used for the purpose of research. We expected that using a non-reportable measure of neglect and violence and the promise to respect the confidentiality resulted in more candid disclosure of this information. We expected concerns about confidentiality would be least for undergraduate students as they completed the assessment online and did not have any direct contact with researchers. However, it is possible that some contextual factors (e.g., the presence of friends) might have influenced the results in this group who completed the assessment online, in contrast to adolescents and clinical sample that were assessed under direct supervision.

Comorbidity of other psychiatric disorders and/or other substance abuse or dependence in clinical sample might have influenced participants' performance on some measures. However, finding a clinical group of patients with only alcohol use disorders, and with no comorbid psychiatric disorder is very difficult and requires a lengthy time for recruitment. Future studies will benefit from more restricted inclusion and exclusion criteria, and longer time for recruitment of clinical participants. I only assessed for the alcohol use and consequently alcohol-related cognitions (expectancies and automatic associations) in this dissertation. Future research should consider the effect of maltreatment on illicit drugs use, and explore the underlying mechanisms that make maltreated individuals at risk for substance use disorders, particularly in clinical populations.

Further, our measures might have underestimated the nature and severity of the neglect and violence as we have used non-reportable and more general questions that assess perceived neglect and violence. In addition, we were unable to measure different aspects of exposure to neglect (e.g., supervision, emotional connection with parents, withholding of food, and other daily necessities) and violence (direct and indirect), that involve traditional measures of

maltreatment. Since we were only interested in examining the effect of perceived neglect and violence and its range, we did not ask about the frequency and duration of exposure to maltreatment, and also the age of occurrence. Nonetheless, studying the other aspects of maltreatment can provide valuable information about the nature of the experience and should be considered in future studies.

Finally, other factors, such as ethnicity, parental substance use, neighborhoods, and school and community characteristics may influence both perceived maltreatment and the initiation and trajectory of alcohol use. Additional research is needed to examine the degree to which these factors may be important. Moreover, as discussed in chapter 2 (section 2.3.4.1), the role of parental substance use is considerable; previous longitudinal studies revealed that children of parents with substance use disorders show higher rates of behavioural disinhibition (e.g., hyperactivity, impulsivity, inattention, and aggression) and subsequent greater alcohol and illicit drug use in comparison with matched children with no parental substance use (Tarter et al., 2003). Given that parental substance use itself has been named as one of the categories of childhood maltreatment (household dysfunctions; Centers for Disease Control and Prevention, 2009), future research in this area should consider assessing parental substance use, and also other contributor factors in this relationship.

Despite these limitations, the results of this dissertation add important findings to the literature of maltreatment and (problematic) alcohol use, by exploring the underlying mechanisms of this relationship in three high risk groups. The current dissertation was focused specifically on neglect and violence, which are the least studied categories of maltreatment in previous research. It also focused on more sensitive measures of these factors than in previous research on maltreatment. Important sex differences were observed in the effect of

maltreatment on alcohol use and other variables of this dissertation. In addition, despite the numerous studies investigating experience of maltreatment and victimization in women, few studies have explored the effect of maltreatment on later health problems in men. Results from studies such as this dissertation are important and begin to point the way to a more detailed and accurate analysis of sex differences. The findings of this study may be useful for the development of targeted prevention and treatment strategies of alcohol use disorders in maltreated individuals with a focus on the importance of mechanisms that mediate this relationship to increase the effectiveness of the intervention programs in this vulnerable population. In addition, this dissertation provides a strong foundation for future research regarding the relationships between neglect and violence and alcohol use in adolescents, young adults (undergraduate students), and patients under treatment for SUDs.

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Appendix A: Assessments

1. Word Associations

Note this section shows the paper based version. This measure has been converted to a web-based delivery including self-coding of responses (Krank et al., 2010; Frigon and Krank, 2009).

For the first set of items, please type the VERY first word or phrase that comes to mind after reading each word. Work quickly!

For example:

Type the VERY FIRST word or phrase that “pops to mind”

salt: pepper (first word or phrase that comes to mind)

Ring	_____
Closet	_____
Mug	_____
Rock	_____
Bud	_____
Ice	_____
Screw	_____
Rave	_____
Hit	_____
Joint	_____
Pipe	_____
Draft	_____
Hot	_____
Weed	_____
Speed	_____
Pot	_____
Bottle	_____
Shot	_____
Blunt	_____
Cooler	_____
Roach	_____

2. Behaviour Associations

Note this section shows the paper based version. This measure has been converted to a web-based delivery including self-coding of responses (Krank et al., 2010; Frigon & Krank, 2009).

This section asks you about how you would respond in the future to a variety of situations.

For the following phrases, type with the first behaviour that comes to mind.

Example: If I feel hungry, then I will..... Have a snack.

Please type your response in the text field. Remember to respond with the FIRST behaviour

that "pops to mind."

Work quickly!

- If I am in a bad mood, then I will.....
- If I want to feel happy, then I will.....
- If I feel bored, then I will.....
- If I am going to a party, then I will.....
- If I want to feel more comfortable or relaxed in an unfamiliar situation, then I will.....
- If I am feeling lonely, then I will.....
- If I want to fit in or feel more included with my peers, then I will.....
- If I am stressed out, then I will.....
- If I want to have fun, then I will.....
- If I want to be more open to experiences, then I will.....
- If I want to relax, then I will.....
- If I want to have a really good time, then I will.....
- If I feel nervous or anxious, then I will.....
- If I feel upset or depressed, then I will.....
- If I want to get rid of physical pain, then I will.....
- If I feel like celebrating, then I will.....
- If I am having trouble sleeping, then I will.....
- If I want to forget my worries or problems, then I will.....
- If I want to be more sociable, then I will.....
- If I want to feel more self-confident, then I will.....

Note. Self-Coding Categories for Implicit Associations: Recreation/Leisure, Violence, Family/Friends, Food, Alcohol, Marijuana, Other Drugs, Other

3. Open-Ended Outcome Expectancy

Note this section shows the paper based version. This measure has been converted to a web-based delivery including self-coding of responses (Krank et al., 2010; Frigon & Krank, 2009).

This section asks you to tell us about what you think the effects of using a moderate amount of alcohol would be. We do not assume that you have used alcohol. Please answer this question even if you have never had a drink of alcohol. We are interested in what you anticipate would happen.

Directions: Please enter the four most important things that you would expect or anticipate to happen if you drank a moderate amount of alcohol. Then indicate how much you would like or not like this outcome if it happened.

Even if you have never drunk alcohol we are interested in what you think would happen to you.

How much would you like this outcome?

	Like a lot	Like	Neither	Not Like	Not Like a lot
a. _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Note. Self-Coding Categories for Expectancies (Adolescents):

1. Feeling Good, 2. Feeling Better, 3. Feeling Bad, 4. Feeling Worse

Note. Self-Coding Categories for Alcohol Expectancies (Undergraduate Students, and Clinical Patients):

1. Letting Go, 2. Dealing with Difficulties, 3. Enjoying Things, 4. Impairment, 5. Enhancing Experience

4. Substance Use Risk Personality Scale (SURPS; Woicik et al., 2009)

Questions about some of your feelings or life experiences

For these questions you will be given a statement about your feelings or experiences and

asked how much you agree that they are true about you.

These questions are about you.

Please indicate how much you would agree or disagree with each statement. Work quickly!

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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1. I am content
2. I would like to learn how to drive a motorcycle
3. I feel proud of my accomplishments
4. I get scared when I'm too nervous
5. I often don't think things through before I speak
6. I would like to skydive
7. I am happy
8. I often involve myself in situations that I later regret being involved in
9. I enjoy new and exciting experiences even if they are unusual
10. I have faith that my future holds great promise
11. It's frightening to feel dizzy or faint
12. I like doing things that frighten me a little
13. It frightens me when I feel my heart beat change
14. I usually act without stopping to think
15. Generally, I am an impulsive person
16. I am interested in experience for its own sake even if it is illegal
17. I feel that I'm a failure
18. I get scared when I experience unusual body sensations
19. I would enjoy hiking long distances in wild and uninhabited territory
20. I feel pleasant
21. It scares me when I'm unable to focus on a task
22. I feel I have to be manipulative to get what I want
23. I am very enthusiastic about my future

5. Neglect and Violence Questionnaire

Questions about some of your feelings or life experiences

For these questions you will be given a statement about your feelings or experiences and asked how much you agree that they are true about you.

These questions are about you.

Please indicate how much you would agree or disagree with each statement. Work quickly!

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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1. My family is always there for me.
2. I have seen a lot of violence in my life.
3. My family always looks after me.
4. Fighting is a normal part of life.
5. My family is affectionate.
6. I have seen a lot of violence in school.
7. I feel that my family cares about me.
8. I have seen a lot of violence in my neighborhood.
9. I am treated well by people.
10. I have experienced significant trauma in my life.
11. I never go hungry.
12. People older than me are mean to me.

6. Future Orientation Scale (Steinberg et al., 2009)

What Am I Like?

The following questions ask about what you are like. Each question gives two statements.

First choose the statement that is most like you, then indicate whether the statement is really true for you or sort of true for you. Select only one answer each question.

Remember to choose only one answer.

1. Some people would rather be happy today than take their chances on what might happen in the future

Really True
for Me

☐

Sort of True
for Me

☐

BUT

Other people will give up their happiness now so that they can get what they want in the future

Really True
for Me

☐

Sort of True
for Me

☐

2. Some people spend very little time thinking about how things might be in the future

Really True
for Me

☐

Sort of True
for Me

☐

BUT

Other people spend a lot of time thinking about how things might be in the future

Really True
for Me

☐

Sort of True
for Me

☐

3. Some people like to think about all of the possible good and bad things that can happen before making a decision

Really True
for Me

☐

Sort of True
for Me

☐

BUT

Other people don't think it's necessary to think about every little possibility before making a decision

Really True
for Me

☐

Sort of True
for Me

☐

4. Some people usually think about the consequences before they do something

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

BUT

Other people just act-they don't waste time thinking about the consequences

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

5. Some people would rather be happy today than take their chances on what might happen in the future

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

BUT

Other people will give up their happiness now so that they can get what they want in the future

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

6. Some people are always making lists of things to do

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

BUT

Other people find making lists of things to do a waste of time

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

7. Some people make decisions and then act without making a plan

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

BUT

Other people usually make plans before going ahead with their decisions

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

8. Some people would rather save their money for a rainy day than spend it right away on something fun

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

BUT

Other people would rather spend their money right away on something fun than save it for a rainy day

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

9. Some people have trouble imagining how things might play out over time

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

BUT

Other people are usually pretty good at seeing in advance how one thing can lead to another

Really True for Me	Sort of True for Me
<input type="checkbox"/>	<input type="checkbox"/>

10. Some people don't spend much time worrying about how their decisions will affect others

Really True
for Me

☐

Sort of True
for Me

☐

BUT

Other people think a lot about how their decisions will affect others

Really True
for Me

☐

Sort of True
for Me

☐

11. Some people often think what their life will be like 10 years from now

Really True
for Me

☐

Sort of True
for Me

☐

BUT

Other people don't even try to imagine what their life will be like in 10 years

Really True
for Me

☐

Sort of True
for Me

☐

12. Some people think that planning things out in advance is a waste of time

Really True
for Me

☐

Sort of True
for Me

☐

BUT

Other people think that things work out better if they are planned out in advance

Really True
for Me

☐

Sort of True
for Me

☐

13. Some people like to take big projects and break them down into small steps before starting to work on them

Really True
for Me

☐

Sort of True
for Me

☐

BUT

Other people find that breaking big projects down into small steps isn't really necessary

Really True
for Me

☐

Sort of True
for Me

☐

14. Some people take life one day at a time without worrying about the future

Really True
for Me

☐

Sort of True
for Me

☐

BUT

Other people are always thinking about what tomorrow will bring

Really True
for Me

☐

Sort of True
for Me

☐

15. Some people think it's better to run through all the possible outcomes of a decision in your mind before deciding what to do

BUT

Other people think it's better to make up your mind without worrying about things you can't predict

Really True
for Me

☐

Sort of True
for Me

☐

Really True
for Me

☐

Sort of True
for Me

☐

7. Perceived Stress Scale (PSS; Cohen et al., 1983)

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

In the last month, how often have you ...

0 = Never 1 = Almost Never 2 = Sometimes
3 = Fairly Often 4 = Very Often

1. been upset because of something that happened unexpectedly?
2. felt that you were unable to control the important things in your life?
3. felt nervous and “stressed”?
4. felt confident about your ability to handle your personal problems?
5. felt that things were going your way?
6. found that you could not cope with all the things that you had to do?
7. been able to control irritations in your life?
8. felt that you were on top of things?
9. been angered because of things that were outside of your control?
10. felt difficulties were piling up so high that you could not overcome them?

8. Alcohol Use

1. Recency of Alcohol Use:

When was the last time you drank alcohol?

Never	More than a year ago	In the past year	In the past month	In the past week
(1)	(2)	(3)	(4)	(5)

2. Frequency of Alcohol Use:

How many days in the past 30 did you drink alcohol? days

3. Quantity of Alcohol Use:

On a day when you drank alcohol how many drinks would you have??

9. Alcohol Use Disorders Identification Test (AUDIT)

Questions	Scoring system				
	0	1	2	3	4
How often do you have a drink containing alcohol?	Never	Monthly or less	2 - 4 times per month	2 - 3 times per week	4+ times per week
How many units of alcohol do you drink on a typical day when you are drinking?	1 - 2	3 - 4	5 - 6	7 - 9	10+
How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you failed to do what was normally expected from you because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you needed an alcoholic drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you been unable to remember what happened the night before	Never	Less than monthly	Monthly	Weekly	Daily or almost daily

because you had been drinking?					
Have you or somebody else been injured as a result of your drinking?	No		Yes, but not in the last year		Yes, during the last year
Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested that you cut down?	No		Yes, but not in the last year		Yes, during the last year