# Childhood Adversity and Alcohol Use Problems in Emerging Adults: Investigating the Role of Stress and Coping Strategies

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Thesis submitted in partial fulfilment of M.A. Clinical Psychology

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August 12, 2022

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**Abstract**

Within Canada, alcohol use and alcohol related problems are experienced disproportionately by emerging adults (aged 18 to 29). Furthermore, emerging adulthood is characterized by events (e.g., beginning post-secondary studies) associated with high-stress levels. Individuals sensitized to stress via experiences of childhood adversity may be at a heightened risk of using alcohol as a coping strategy to alleviate experiences of acute stress during this transitional period. This strategy is, however, maladaptive because alcohol use can increase the risk for adverse outcomes such as poor interpersonal relationships and academic outcomes and does not address the cause of the distress. As such, the proposed study examined explanatory models that predicted alcohol use and related problems in emerging adults. It was hypothesized that perceived stress and disengagement coping (i.e., strategies aimed at diverting from the stressor and/or its associated emotions) would explain the relationship between childhood adversity and alcohol use and related problems. Students at Lakehead University ($N$ = 150) were recruited to complete a series of self-report measures assessing childhood adversity, perceived stress, disengagement coping strategies, and alcohol variables (frequency, quantity, and problems). As expected, childhood adversity was positively and significantly associated with all study variables, except alcohol frequency and quantity. Perceived stress and disengagement coping strategies mediated the relationship between childhood adversity and alcohol related problems. Unexpectedly, perceived stress and disengagement coping strategies did not mediate the relationship between childhood adversity and alcohol frequency. Results suggest that university institutions might consider providing education around stress management through trauma-informed practices and coping strategies to mitigate the impact of early adversity on later alcohol related problems among emerging adults.

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**Childhood Adversity and Alcohol Use in Emerging Adults: Investigating the Roles of Perceived Stress and Coping Strategies**

Theory and research evidence suggests that childhood environments play a crucial role in adult health (Shonkoff et al., 2012). Research in this area highlights the importance of investigating the role of development factors and their long term impact on physical and mental wellbeing in adulthood. The accumulating research on the development of various psychiatric disorders has long favoured a relationship between childhood experiences, stress, and mental health outcomes. These observations suggest that strong, frequent, or prolonged experiences of stress during development due to adverse childhood experiences (ACEs) have considerable impact on stress responsivity and stress-related health outcomes (Shonkoff et al., 2012).

Childhood adversity refers to events (i.e., abuse [physical, sexual, emotional], neglect, exposure to actual or potential life-threatening situations,, stress) that occur in childhood (i.e., before 18 years old) and are outside of the control of the child (Burgermeister, 2007). Childhood adversities are widely prevalent and often co-occur in the general population (Afifi et al., 2014; Felitti et al., 1998; Finkelhor et al., 2015; Kessler et al., 1997). For example, in a nationally representative sample of Canadian adults ($N = 23,395$), the prevalence of any child abuse (i.e., physical abuse, sexual abuse, and exposure to intimate partner violence) was 32% and predicted a wide range of adverse mental health outcomes, including suicidal ideation and suicide attempts (Afifi et al., 2014). Furthermore, childhood adversity predicts a wide range of negative mental health outcomes (e.g., suicidal ideation and attempts, psychiatric disorder) in a dose-response relationship (Afifi et al., 2014; Felitti et al., 1998; McLaughlin et al., 2010). Among these findings, one commonly associated negative consequence of childhood adversity is increased and problematic substance use.

Numerous studies have demonstrated a link between retrospectively documented childhood adversity and substance use (Benjet et al., 2013; Enoch, 2011; Evans et al., 2017; Lijffijt et al., 2014; Moustafa et al., 2018). In general, the prevalence of childhood adversity is elevated among individuals with problematic substance use and across substance types (Lijffijt et al., 2014). In a large retrospective study examining childhood adversity in more than 17,000 American adults, Felitti and colleagues (1998) found a significant dose-response relationship between self-reported childhood adversity and adult substance use. This means that with each increase of exposure to a childhood adversity there was an associated, gradual increase in risk for substance use behaviours (Felitti et al., 1998). This finding has been replicated in several other studies looking at specific substances such as alcohol (Dube et al., 2002, 2003; Ramos-Olazagasti et al., 2017). In a longitudinal study using a nationally representative sample of adolescents ($N$ = 11,279) in the United States (U.S.), risk for developing alcohol use disorder in adulthood was assessed across 3 time points (between the ages of 12 – 18, 18 – 26 and 24 – 32; LeTendre & Reed, 2017). The authors found that with each increase of exposure to different types of childhood adversity (i.e., emotional, physical, and sexual abuse), there was at least a 34% increase in the odds of developing a clinically significant alcohol use disorder in adulthood (LeTendre & Reed, 2017). Similarly, in a large sample of U.S.-based adults (n = 17,337), Anda and colleagues (2002) found that retrospectively reported ACEs were associated with alcohol use and misuse in adulthood regardless of exposure to parental alcoholism and experiencing multiple ACEs increased the likelihood of problematic alcohol use as an adult (Anda et al., 2002). Thus, both cross-sectional and longitudinal studies find a significant positive relationship between the risk of developing alcohol and drug use problems and ACEs (Hill et al., 1994).

Preventing substance use problems must occur early, prior to the development of harmful, chronic patterns of use. In this respect, emerging adulthood represents a critical period for prevention and intervention. During this influential period spanning from approximately age 18 to 29 (Arnett, 2000, 2015), alcohol use typically begins and escalates (Johnston et al., 2004; Johnston et al., 2020; Lijffijt et al., 2014), with the majority of lifetime cases of alcohol use disorders beginning prior to age 24 (Kessler et al., 2005). Examining mechanisms linking childhood adversity and alcohol use has the greatest relevance for prevention if outcomes are measured in early adulthood.

**Alcohol Use in Emerging Adulthood**

Substance use patterns vary with age. Of particular importance is the "emerging adulthood" stage, the period between late adolescence (i.e., 18 years of age) and early adulthood (i.e., 29 years of age; Arnett, 2000, 2015). Emerging adulthood is characterized by a common and important transition period as many individuals progress from high school to post-secondary studies to pursue greater educational and career opportunities. In fact, the percentage of emerging adults pursuing post-secondary education is at its highest in Canadian history since 1995 (Statistics Canada, 2016) and is an important experience (Arnett, 2014). This transition period is characterized by a variety of rapid changes including separation from families and old friends, formation and strengthening of personal relationships, experiences of academic demands, increased independence, identity exploration, and increased financial pressures (e.g., cost of tuition and living accommodations; Arnett, 2005; Maggs, 1997; Schulenberg & Maggs, 2002). In particular, the competitive nature, pressurized academic environment, and the possibility of failure to master related tasks can lead to feelings of frustration and stress, and a variety of maladaptive behaviours, including problematic alcohol use (Pedrelli et al., 2015). This

is demonstrated in the research literature, which shows a heightened risk for the onset of alcohol use and alcohol related problems (ARPs) among emerging adults, particularly post-secondary students (Arnett, 2005; Hingson et al., 2002, 2017; Johnston et al., 2010).

In Canada, 83.5% of emerging adults aged 20–24 report consuming alcohol in the past year which is higher than rates of alcohol consumed in the past year by individuals aged 15-19 (56.8%) or 25 and over (79.4%; Canadian Centre on Substance Use and Addiction [CCSA], 2019; Statistics Canada, 2019). Notably, alcohol use is somewhat unique for emerging adults compared to the use of other substances, given that emerging adulthood encompasses the age at which alcohol use becomes legal. New legality may explain the peak rate of heavy episodic drinking (HED; five or more drinks on one occasion for males or four or more drinks on one occasion for females) among emerging adults. In a large sample of 18-24 year old attending (n = 6,930) and not attending a post-secondary institution (n = 12,394), students were more likely than same-age nonstudents to engage in HED and drive under the influence of alcohol (Hingson et al., 2002). In another study, drinking prevalence over the past 30 days and HED was highest among emerging adults attending university or college in comparison to those not pursuing post-secondary education or enrolled in technical school/community college (Simons-Morton et al., 2016). Not only are rates of alcohol use high among student emerging adults, but use can result in several negative consequences such as poor academic performance (Wechsler et al., 2000), increased rates of school drop-out (Arria et al., 2013), unintentional injuries (Hingson & Zha, 2009) and engagement in other risky behaviours (Hingson et al., 2017; Petruželka et al., 2018; Wechsler et al., 2000).

Some researchers have suggested that emerging adults may use alcohol as a coping strategy to self-medicate experiences of stress associated with the transition from adolescence to

adulthood (Arnett, 2005; Goldstein et al., 2011, 2011; Goodman et al., 2016; Zhu et al., 2019). Although drinking to cope with stress provides short-term relief, consuming alcohol to manage stress is associated with a higher frequency of drinking to intoxication, higher instance of HED, and more ARPs (Park & Levenson, 2002; Tyssen et al., 1998). Given these findings, drinking alcohol to manage stress is a maladaptive strategy as it increases the risk of developing alcohol-dependent habits that persist after leaving the post-secondary environment (Sadava & Pak, 1993) and is associated with poorer outcomes in academic (Singleton & Wolfson, 2009), adaptive and social domains (American Psychiatric Association, 2013). This suggests that emerging adults, especially post-secondary students, who have trouble during this transitional period may use alcohol as a way to cope with the psychological stress associated with this developmental period (Zhu et al., 2019). Emerging adults that are also students are an especially vulnerable subset of the population at risk for the development of problematic alcohol use as they are confronted with not only entering a unique developmental stage, but also adjusting to other aspects of life that are additional sources of stress.

**What is Stress?**

Hans Selye first introduced the term "stress" into psychology in the early 1900's (Fink, 2010). Selye actually used the term "strain" to distinguish between psychological (subjective) stress and external factors (environmental stimuli; Fink, 2010; Jackson, 2014; Selye, 1956). External factors, also referred to as stressors, are those that occur over a specified time period and include a variety of events, such as death or serious illness of a family member or close friend, relocation, being fired or laid off, a financial crisis, trouble with a boss or coworker, separation, divorce or break-up, serious interpersonal strain with a friend, neighbor or relative, contact with law-enforcement, or being a victim of violence (Keyes et al., 2011). On the other

hand, stress is the individual's reaction to a stressor (i.e., a specific environmental condition/event) based on one's appraisal of the situation and the required mental or physiological adjustment to the situation (Kemeny, 2003).

According to Lazarus and Folkman (1984), stress is experienced when a given situation is perceived as a threat to wellbeing and when the demands are perceived to outweigh the resources available to address the specific situation. This definition draws attention to the processes whereby people appraise their environments as potentially threatening and challenging, and away from the assessment of the nature of environmental stressors (Jones & Bright, 2001). Under this definition, stress is not characterized by a specific kind of environmental stimulus (Kumanova & Karastoyanov, 2013). Rather, stress is viewed as a unique relationship between the environmental demands and the individual. Integrated into the concept of stress is the idea of coping. Briefly, coping refers to the ways that people respond to and interact with stress and stressors (Cohen et al., 1983; Lazarus & Folkman, 1984; Zamble & Gekoski, 1994). Therefore, the term coping refers to the set of behaviours used by an individual to manage stress, regardless of whether these strategies are beneficial or not (Lazarus & Folkman, 1984). When an individual encounters a stressful situation, mediating processes (appraisal of the situation and available coping strategies) are engaged by the individual and influence the immediate and long-term effects of the stressful situation (Lazarus & Folkman, 1984). Lazarus and Folkman (1984) expanded on this process in their cognitive-relational theory of stress.

The cognitive-relational theory of stress distinguishes between two basic forms of cognitive appraisal, primary and secondary appraisal (Lazarus & Folkman, 1984). Primary appraisal is concerned with the potential impact of a stressful situation on the individual's well-being, including how important a person perceives the situation to be, or what is perceived to be

at stake. Encounters are appraised as irrelevant, benign-positive (beneficial), or stressful. When an event is evaluated as stressful, the stressor can be further appraised (secondary appraisal) on what can be done to overcome, to prevent harm, or to improve the prospects for benefit. Secondary appraisal involves a complex assessment of one's perceived resources to cope effectively with the situation and reestablish equilibrium between the person and environment. As a result of combining these cognitive components, a stress response will be experienced when there is an imbalance between a person's judgment of the situation and their ability to meet the demands (Lazarus & Folkman, 1984). This theoretical perspective is more commonly measured by assessing perceived stress, the degree to which situations in one's life are appraised as stressful (Cohen et al., 1983). Perceived stress is high when both the situation is appraised as unpredictable, negative, uncontrollable and/or overwhelming, and resources available to cope with the situation are believed to be insufficient (Cohen et al., 1983; Compas et al., 2001). Perceived stress and the resultant coping efforts bring about both instantaneous effects, such as changes in an individual's affect or physiological response, and long-term effects that impact psychological and physical well-being.

**Stress Sensitization Model**

The impact of stress on an individual's wellbeing can vary. Stressors that are mild or moderately challenging and limited in duration lead to cognitive and behavioural adaptive responses that are goal-directed (Sinha, 2008). For example, participating in a major sport competition or performing in a theatrical production can generate pleasurable, satisfying experiences that result from stress (Baqutayan, 2015). This "good stress" can generate a sense of mastery and accomplishment and is often perceived as a pleasant, positive, or joyful response to a stressor (Harris, 1970; Lazarus, 1993). On the other hand, prolonged, repeated, or chronic

stressors generates feelings of uncontrollability, unpredictability, and lack of adaptability and mastery of the stressor that results in a greater magnitude of perceived stress (Cohen et al., 1983; Kemeny, 2003; Post et al., 2001; Sinha, 2008). For example, several studies find that bullying, a severe and chronic stressor, is associated with high levels of perceived stress and contributes to poorer outcomes (e.g., cannabis use, recurrent pain; Cañas et al., 2020; Martinelli et al., 2011; Östberg et al., 2018)

The stress sensitization model (Post, 1992; Stroud, 2019) proposes that exposure to early psychosocial stressors (childhood adversity) alter psychobiological stress response systems during development, thereby physiologically and psychologically sensitizing individuals to minor stressors later in life (Dienes et al., 2006; Hammen et al., 2000; Post, 1992; Post et al., 2001; Stroud, 2019). In this way, early sources of stress can increase an individual's vulnerability to the effects of stressors later in life when compared to individuals with no exposure to the early stressor. The stress sensitization model was originally proposed to explain both the onset and course of bipolar disorder (Dienes et al., 2006; Monroe & Harkness, 2005; Post, 1992; Stroud, 2019) whereby sensitization could occur through two proposed pathways: stress autonomy (i.e., kindling/behavioural sensitization) and stress sensitization (i.e., early adversity sensitization). Despite its origin in explaining bipolar disorder, the stress sensitization model has come to provide an explanation for how exposure to early adversities augments liability for substance use, including alcohol, within the context of stress (J. H. Kim et al., 2014; Myers et al., 2014; Young-Wolff et al., 2012).

### *Stress Autonomy*

The stress autonomy pathway focuses on the effects of proximal stressors that precipitate the initial episode of bipolar disorder, while the reoccurrence of episodes is precipitated by

progressively lower levels of a stimuli (i.e., stress) over time (Post, 1992; Stroud et al., 2019). This pathway has received some empirical support in the literature (Hammen et al., 2000; Kendler et al., 2000; Segal et al., 1996; Sharp et al., 2012). For example, Hammen and Gitlin (1997) reported that patients with a greater number of previous bipolar episodes were more likely to relapse following severe life stress in the preceding 3 months and 6 months in comparison with the patients who did not relapse. However, subsequent work has found a lack of a statistical relationship between the number of previous episodes and the level of stress prior to recurrence (Bender & Alloy, 2011; Dienes et al., 2006; Hlastala et al., 2000). For example, a cross-sectional study by Dienes and colleagues (2006) found no significant interaction between stress and number of episodes in predicting episodes of bipolar recurrence in patients with a diagnosis of bipolar I disorder. In a review of stress autonomy in depression, Monroe and Harkness (2005) found that both mild and severe stress precipitated recurrence of a depressive episode, in comparison to a gradual lower level of a stress stimulus as proposed by the stress autonomy pathway. Given the lack of support for the stress autonomy pathway in explaining the onset and course of psychopathology, the proposed study will focus on the stress sensitization pathway.

***Stress Sensitization***

The stress sensitization pathway proposes that the experience of early adverse events alters biological and psychological stress regulation and response systems during critical developmental periods (Heim & Nemeroff, 1999; Stroud, 2019), thereby sensitizing individuals to perceive stressors as challenging and threatening to one's wellbeing (Hammen et al., 2000; Post et al., 2001; Stroud, 2019). Accumulating evidence suggests that early adversity can tax a child's developing biological and psychosocial systems well into adulthood such that even

relatively minor stressors elicit heightened reactions (Albott et al., 2018; Bürgin et al., 2021; Heim, 2000; Heim et al., 2002; Manyema et al., 2018; Nurius et al., 2015).

For example, Trickett and colleagues (2010) assessed basal and morning cortisol (a physiological indictor of stress reactivity) in women with and without childhood sexual abuse longitudinally from age 6 to 30. They found that women with a history of early adversity experienced heighten cortisol activity following the adverse experience in childhood and an attenuated cortisol activity starting in adolescence, with significantly lower levels of cortisol by early adulthood. Although hyposecretion of cortisol over time may be an adaptive response to stress, very low levels of cortisol is associated with psychosocial problems and poorer physiological health that are often present among individuals with a history of childhood adversity (Trickett et al., 2010). In a review of research on the neurobiological correlates of childhood adversity, key stress-related factors such as neuroendocrine, neurotrophic, and other stress physiological systems (e.g., hypothalamic–pituitary–adrenal axis and sympathetic nervous system) are altered in response to early trauma and may be involved in the pathogenesis of psychopathology (Tyrka et al., 2013). Similar effects are observed in subjective perceptions of stressfulness among individuals with exposure to early-life stress (LoPilato et al., 2020; McLaughlin et al., 2010; Rössler et al., 2016). For example in a retrospective, cross-sectional study, Hager and Runtz (2012) found that perceived stress was significantly and positively associated with childhood adversity in a community sample of adult women (n = 235). Overall, the previous research on childhood adversity finds that early-life stress leads to developmental changes in the neural systems that coordinate stress responding and changes in psychological perceptions of stress resulting in a stress-sensitized brain.

Further support for the stress sensitization model comes from studies that find a heightened stress response to acute sources of stress among individuals with a history of childhood adversity (Carpenter et al., 2007, 2010; MacMillan et al., 2009). For example, Carpenter and colleagues (2007) examined plasma adrenocorticotropin (ACTH; neuroendocrine indictor of stress reactivity) and cortisol reactivity to a laboratory induced psychosocial stress in healthy adults (n = 50) with and without a history of childhood adversity. They found that, compared to controls, individuals with ACEs exhibited significantly lower cortisol and plasma ACTH in response to an acute stress challenge (Carpenter et al., 2007). In a large general population sample of U.S.-based middle aged adults (n = 1,252), greater retrospectively reported childhood adversity was associated with greater perceived stress in adulthood. Additionally, the authors replicated their findings in a large independent sample (n = 862) and found the same relationships (Betz et al., 2020). In a cross-sectional study, McLaughlin and colleagues (2010) investigated the associations between past-year stressful events and perceived stress among nationally representative sample of U.S. adults (n = 34, 653). They found that with each increase in exposure to past-year stressful events, they observed a corresponding increase in perceived stress among individuals with three or more childhood adversities compared to individuals with no childhood adversity (McLaughlin et al., 2010). These findings corroborate previous evidence that childhood adversity not only leads to physical and psychological changes in an individual's stress response but also heightens stress reactivity following a recent stressor as proposed by the stress sensitization model. Consequently, childhood adversity may exert its influence into adulthood through chronic dysregulations in stress responsivity that results in sensitization to stressors such that those events are perceived to be more overwhelming or unmanageable.

Ultimately, this pathway may contribute to maladaptive ways of regulating stress that can increase risk for engagement in alcohol use.

## Using the Stress Sensitization Model to Explain Alcohol Use Among Individuals with a History of Childhood Adversity

As mentioned previously, exposure to childhood adversity is associated with an increased risk for alcohol use and alcohol use disorders (Afifi et al., 2014; Felitti et al., 1998; LeTendre & Reed, 2017). The stress sensitization model offers one potential explanation for this association. The model suggests that early life stress increases sensitivity to future stressors such that one's response to a stressor is heightened. In order to attenuate experiences of stress, an individual may use alcohol as a way to cope with stress (Enoch, 2011). Exposure to both distal (childhood adversity) and recent stress interact to impact substance use patterns such as alcohol throughout the lifespan (Enoch, 2011). Thus, the relationship between childhood adversity and alcohol use may be explained by an increased experience of stress and subsequent use of maladaptive strategies to attenuate stress that results in alcohol use. To date, the majority of the studies in this area have assessed the role of stressors (i.e., environmental stimuli) in explaining the relationship between childhood adversity and alcohol use. However, studies investigating subjective perceptions of stress in explaining the relationship between alcohol use and childhood adversity are lacking.

### *Relationship Between Stressors and Alcohol Use*

Previous studies on substance use have largely been focused on assessment of environmental stimuli. Several cross-sectional studies using nationally representative samples found that recent stressful events predicted alcohol use and craving among individuals with a history of childhood adversity. Using a large twin sample from the U.S. (n = 4,038), Young-

Wolff and colleagues (2012) assessed past-year drinking density, past-year stressful life events, and childhood maltreatment using structured clinical interviews. They found that stressful life events were associated with heavier drinking among women exposed to childhood adversity than those without exposure to childhood adversity (Young-Wolff et al., 2012). Similarly, Keyes and colleagues (2014) found that risk for current alcohol use disorder, assessed using a psychiatric structured interview, increased more after exposure to wartime stress among Israeli adults (n = 1,306) with a history of childhood adversity than in those without a history of childhood adversity. Looking at alcohol craving as an outcome, Kim and colleagues (2014) retrospectively examined the relationship between past-year stressful life events and alcohol craving in a large sample of past-year drinkers (n = 22,147) with and without a history of childhood maltreatment. They found that the risk of severe alcohol craving was significantly elevated among participants with a history of childhood adversity than those without when faced with similar levels of stressful events, even after controlling for internalizing and externalizing comorbidity (Kim et al., 2014). The previous evidence suggests that stressors are one mechanism through which childhood adversity increases the risk for alcohol craving, use and dependency in adulthood.

***Relationship between Perceived Stress and Alcohol Use***

The previous evidence suggests that individuals exposed to stressful environments or situations during childhood are sensitized to future stress and subsequent substance use, including alcohol (Hammen et al., 2000; Lijffijt et al., 2014; Post et al., 2001; Stroud, 2019; Wells, 2017). Consistent with predictions of the stress sensitization model, the association between recent stressors and adverse outcomes, such as problematic alcohol use, is consistently stronger among adults with a history of childhood adversity. However, this relation has primarily been investigated using measures of objectively identifiable stressful events. A general limitation

with this research is that negative life events by themselves cannot fully account for problematic alcohol use. Certain individuals may be at special risk for the adverse impact of stressful events based on their subjective appraisal of the stressors (Cohen et al., 1983). In general, perceived stress measures are better predictors and primary mediators of health-related outcomes than are scores derived from either a simple counting of events or normative adjustment ratings that are commonly used in measures of stressful life events (Cohen et al., 1983; Feizi et al., 2012; Kuiper et al., 1986; Lazarus et al., 1985). Despite the central role of stress in the stress sensitization model, most studies on the stress–alcohol association have focused on stressors and have failed to consider the role of the psychological effects of stressors.

To date there are no studies investigating the role of perceived stress in explaining the relationship between childhood adversity and alcohol use. A limited number of studies have examined the relationship between childhood adversity and subjective evaluation and perception of stressful situations among non-alcohol substance users (Garami et al., 2019; Medrano et al., 2002). In a retrospective study by Edalati and colleagues (2020), exposure to childhood adversity was associated with higher levels of perceived stress among patients with a concurrent substance use and psychiatric disorder seeking treatment at a residential center (n = 100; Edalati et al., 2020). Additionally, they found this association even after controlling for demographic characteristics, diagnoses of psychiatric disorders, and length of stay in the center. In another study, Hyman and colleagues (2007) found that the severity of childhood adversity among recently abstinent cocaine dependent adults (n = 91) was significantly associated with perceived stress, specifically childhood adversity explained 11% of the variance in perceived stress. Thus, the previous findings suggest that childhood adversity negatively affects perceived stress levels among those with substance dependence. However, these studies did not examine this

relationship among alcohol use. More research is needed to investigate this relationship, especially among alcohol users, non-dependent individuals and emerging adults given that they experience increased amounts of stress.

## The Role of Coping in the Association Between Stress and Alcohol Use

As mentioned previously, stress is defined as an ongoing interaction between the individual and their environmental demands that is based on: (1) the degree to which situations are perceived as stressful, and (2) whether sufficient resources are available to cope with the situation (Cohen et al., 1983; Kemeny, 2003; Lazarus & Folkman, 1984). The coping strategies currently employed by individuals to manage stress can forecast future, lifelong consequences. Whereas effective coping promotes growth and positive outcomes, ineffective coping strategies heightens an individual's risk for developing emotional and behavioural problems (Anson & Ponsford, 2006; Baker & Berenbaum, 2007; Grossi, 1999).

### *Coping With Stress*

Theoretical conceptualizations of coping focus on cognitive and behavioural efforts used by an individual to manage internal (i.e., emotional arousal or conflict) and/or external (i.e., environmental stimulus) demands in response to a perceived stress (Lazarus & Folkman, 1984). Similar to the Lazarus and Folkman (1984), Matheny and colleagues (1986) review of the literature on coping defined it as "any effort, healthy or unhealthy, conscious or unconscious, to prevent, eliminate, or weaken stressors, or to tolerate their effects in the least hurtful manner." This definition of coping highlights that not all coping efforts are healthy and constructive and, for some individuals, the coping strategy that they adopt will increase their risk for poorer outcomes. Thus, the ways in which people cope with stress can reduce or amplify the effects of

adverse life events and conditions on the development of physical and mental health or disorders in the long term (Skinner et al., 2003).

Researchers have grouped the ways that people cope with stress into several different categories. Lazarus and Folkman (1980, 1984) highlight two major styles of functional coping: problem-focused coping (i.e., managing or altering the stressor), and emotion-focused coping (i.e., regulating emotional responses to the problem). Other theorists have proposed that coping can be defined based on a different set of higher-order categories: avoidant-based coping and approach-based coping. The former involves ignoring or withdrawing from the stressor or associated feelings, whereas the latter reflects dealing with either the problem or related emotions (Roth & Cohen, 1986).

More recently, the perspective has emerged that coping is based on two overarching factors: engagement and disengagement coping (Connor-Smith et al., 2000; Connor-Smith & Calvete, 2004; Yao et al., 2010). Engagement coping is the use of activities that actively deal with the stressor or stressor-related emotion. It can be further divided into primary control strategies (e.g., problem solving, seeking social support) and secondary control strategies (e.g., cognitive reconstruction and acceptance; Connor-Smith et al., 2000; Compas et al., 2001). Disengagement coping includes strategies that are likely to result in disengaging the individual from the stressor and one's responses (Compas et al., 2000). Using hierarchical factor analysis, Tobin and colleagues (1989) found that disengagement and engagement coping are both composed of four secondary factors (i.e., problem engagement, emotion engagement, problem disengagement, and emotion disengagement) and eight primary factors (i.e., problem solving, cognitive restructuring, express emotions, social support, problem avoidance, wishful thinking, self-criticism, and social withdrawal) that are commonly identified in other factor analyses of

coping inventories. Tobin and colleagues' (1989) conceptualization is appealing not just for its clarity, but also for its consistency with the findings of other researchers and accommodation of diverse conceptualizations of coping (e.g., problem- vs. emotion-focused coping, approach vs. avoidance coping).

### *Impact of Childhood Adversity on the Development of Different Coping Strategies*

Coping skills emerge over the course of development from childhood to young adulthood (Compas et al., 2014; Zimmer-Gembeck & Skinner, 2011). Zimmer-Gembeck and Skinner (2011) report that strategies that involve support-seeking and problem-solving behaviours in young children (preschool and middle childhood) are useful techniques for regulating behaviour, attention, and emotion when a stressor is too arousing. On the other hand, use of behavioural escape (i.e., attempts to leave the distressing situation or to avoid direct action to resolve a problem) or avoidance (i.e., efforts to disengage from the stressor) at this stage may signal high stress reactivity or a lack of competent coping strategies. Although coping strategy repertories increase and become flexible with age, coping strategies acquired in earlier years are continuously utilized into adolescence and later years (Compas et al., 2014; Zimmer-Gembeck & Skinner, 2011). As such, children exposed to overwhelming stress such as maltreatment may solidify a maladaptive style of coping due to repeated use of developmentally primitive coping strategies (e.g., avoidance and denial) and a lack of exposure to adaptive alternatives (Wadsworth, 2015). Thus, individuals with exposure to childhood adversity may develop predispositions to cope with future stressors via disengagement strategies which can include behaviours with serious negative consequences (Folkman & Lazarus, 1985; Lazarus & Folkman, 1984; Wadsworth, 2015).

### *Relationship Between Coping Strategies and Childhood Adversity*

Maladaptive coping strategies such as those involved in disengagement coping have commonly been employed by individuals with childhood adversity (Coffey et al., 1996; Fortier et al., 2009; Milojevich, Levine, et al., 2018; Milojevich, Russell, et al., 2018; VanMeter et al., 2020; Widom, 2000). Leitenberg and colleagues (2004) found that cumulative exposure to multiple types of childhood adversity was associated with greater use of disengagement coping strategies among undergraduate women in response to recent stressful events. In another study, university women with a history of childhood sexual abuse were more likely to use disengagement strategies to cope with the experience of past-year sexual assault in comparison to women without a history of childhood sexual abuse (Gibson & Leitenberg, 2001). Although disengagement coping strategies orient one away from the stressor and provide temporary relief in the context of the adversity experienced in childhood, the use of such strategies to cope with stressors in emerging adulthood could be associated with adverse outcomes (Abaied & Rudolph, 2011; Compas et al., 2017). Childhood adversity shapes the available ways to respond to proximal sources of stress, increasing the likelihood of responding to perceived stressors with maladaptive coping strategies and the use of short-sighted behaviours such as alcohol use.

### *Relationship Between Coping Strategies and Alcohol Use*

According to the stress-coping model (Lazarus & Folkman, 1984; Wills & Hirky, 1996; Wills & Shiffman, 1985), coping strategies are used to deal with general life stress and used in an effort to maintain physical and psychosocial wellbeing. Under this model, stress does not have an equal negative effect on all individuals. How an individual copes in response to stress determines the difference between a positive or negative developmental condition (Lazarus & Folkman, 1984). Therefore, to predict the consequences of stress, it is necessary to understand

the overall coping process. Consistent with this theoretical model and others (e.g., self-medication model, tension reduction hypothesis; Colder, 2001; Greeley & Oei, 1999), individuals who experience and seek regulation of stress from consuming alcohol are at an increased risk for problem drinking through their efforts to self-medicate (Cooper et al., 1995). These models suggest that alcohol use is a coping response to stress that can function to regulate stress and associated affect (Colder, 2001; Greeley & Oei, 1999; Wills & Hirky, 1996; Wills & Shiffman, 1985).

To date, few studies have examined the relationship between disengagement coping and alcohol use. Blumenthal and colleagues (2016) found that disengagement coping predicted desire to drink after exposure to social stress (laboratory introduction) among socially anxious adolescent drinkers (n = 70). Looking at substances in general, Adan and colleagues (2017) and Marquez-Arrico and colleagues (2015) found that patients with substance use disorders, especially those with a higher severity and earlier onset, exhibited higher scores for disengagement coping in comparison to norms. In another study, McConnell and colleagues (2014) found higher levels of disengagement coping were associated with greater odds of self-reported tobacco and cannabis use and intentions to use in the future among a sample of Canadian adolescents (n = 1,352). However, one study found that dimensions typically classified as engagement (e.g., behavioural coping, cognitive coping) and dimensions typically classified as disengagement (e.g., anger coping, avoidant coping) did not predict substance use using confirmatory analyses and regression analyses (Wills et al., 2001). Overall, existing research provides evidence that disengagement coping strategies are commonly employed by individuals with substance use problems and may put individuals at risk for problematic substance use, including alcohol.

Other studies on coping have assessed the primary factors of disengagement coping (e.g., avoidance coping, social withdrawal, self-criticism, wishful thinking) and found that such strategies are commonly employed by individuals with alcohol use problems to buffer the effects of stress and stressful situations (Cleveland & Harris, 2010; Dariotis & Chen, 2020; Wills et al., 2001; Wills & Hirky, 1996). The existing literature most commonly finds that emotion focused and avoidant coping strategies are consistently associated with both HED and ARPs (Britton, 2004; Cooper et al., 1992; Evans & Dunn, 1995; Fromme & Rivet, 1994; Veenstra et al., 2007). Individuals who employ emotion and/or avoidant coping may be more likely to use alcohol to remove, ignore, or distract oneself from stress, thereby temporarily reducing experiences of stress. Such an approach does not provide an individual the space to develop active solutions to regulate experiences of stress but encourages an individual to seek the path of least resistance to restore psychological and physiological balance and, consequently, increases the attractiveness of alcohol use as mode of stress regulation (Eftekhari et al., 2004; Wills & Hirky, 1996). For example, in a sample of college students (n = 1,027), the strategies that comprise the avoidance coping category was associated with increased alcohol consumption (e.g., alcohol use and HED) and higher reports of alcohol-related consequences (e.g., drinking and driving). Furthermore, they found that maladaptive coping strategies partially explained the association between academic stress and alcohol use (Metzger et al., 2017). From the stress-coping perspective, students who have difficulty reducing stress may seek out alcohol to manage their stress and, subsequently, use alcohol in order to experience short-term stress relief (Metzger et al., 2017; Park et al., 2004). Emerging adults  who generally use more maladaptive coping strategies may continue to use alcohol to regulate their stress and build tolerance to alcohol, thereby requiring larger amounts of alcohol. Thus, engagement in problematic alcohol use may be the outcome of

ineffective coping strategies used to regulate stress responsivity (Boys et al., 2001; Glantz, 1992; Sher et al., 1999; Wills, 1985; Wills et al., 2001; Wills & Hirky, 1996). Given that individuals with a history of childhood adversity are more prone to use maladaptive coping strategies, such individuals may be at an increased risk to turn to alcohol use to alleviate their distress.

**Current Gaps in the Literature**

To date, no study has examined the impact of perceived stress and coping strategies on the relationship between childhood adversity and alcohol use. Of the existing literature, only one study has examined how childhood adversity is related to subjective stress and coping among individuals with problematic substance use. Hyman and colleagues (2007) examined this relationship among recently abstinent cocaine dependent adults (n = 91) using self-report measures of childhood maltreatment, perceived stress, and coping strategies. They found that the severity of childhood adversity was significantly associated with perceived stress and avoidance coping in this sample. However, there are several limitations of this study. Primarily, this study did not test to see if perceived stress and avoidance coping explained (or mediated) the relationship between childhood adversity and substance use. Their study only supports the finding that childhood adversity is associated with both perceived stress and avoidance coping among cocaine dependent individuals. Although they suggest that exposure to childhood adversity and the severity of childhood adversity may result in greater sensitivity to stress that could make engagement in substances more negatively reinforcing (Hyman et al., 2007), they did not test for this assertion empirically. Furthermore, this study examined perceived stress and coping only among adults with a substance use disorder, specifically cocaine dependence. It is unknown whether results could generalize to: (a) individuals without substance dependence, (b) other substance types such as alcohol, or (c) emerging adults. Given that alcohol is the most

prevalent drug used by emerging adults (CCSA, 2019) and is associated with several negative outcomes (Baskin-Sommers & Sommers, 2006; Wechsler et al., 2000), these relationships need to explored within this population in order to inform alcohol prevention and intervention strategies for emerging adults.

Of the studies that do measure the previously stated constructs, clear limitations are evident. First, many of the studies focus primarily on the impact of recent stressors, not stress. A majority of studies investigating the association between recent stress and alcohol use among individuals with a history of childhood adversity have assessed stress via counting the number of stressors endorsed in the recent past (Keyes et al., 2014; J. H. Kim et al., 2014; Young-Wolff et al., 2012). Previous studies have indicated that perceived stress is an important determinant and better predictor of stress reactions and health-related outcomes (Cohen et al., 1983; Feizi et al., 2012; Kuiper et al., 1986; Lazarus et al., 1985). For example, one study investigated the relationship between daily stressors, perceived stress and mood ratings among a sample of adult males using experience sampling methodology for five consecutive days (Eck et al., 1999). They found that perceived stress augmented mood reactivity to stressful events; specifically greater perceived stress was associated with longer lasting negative mood changes following events. In this case, the subjective experience of an event determined its impact on mood much more than the context in which it occurred (Eck et al., 1999). Given that not all individuals will respond to stressful events with a stress reaction, the previous approach assumes that a stressful event indefinitely precedes a subjective experience of stress. This method may fail to accurately estimate the impact of stress on alcohol use among individuals with a history of childhood adversity. Furthermore, studies using measures of perceived stress have examined these associations only among substance dependent populations (Edalati et al., 2020; Garami et al.,

2019; Hyman et al., 2007; Medrano et al., 2002). Therefore, it is important to understand whether perceived stress predicts alcohol use and ARPs within a non-clinical emerging adult sample.

Second, post-secondary student life is a stressful period and involves various threats or challenges such as heavy academic workload, fear of failure, competition for high grades, financial inadequacies, and social obligations that can impact wellbeing (Abouserie, 1994; Gall et al., 2000; Kausar, 2010; Mattanah et al., 2004; Sreeramareddy et al., 2007). However, less is known about factors that contribute to the development of problematic alcohol use within this population. It is crucial to understand factors that increase or mitigate negative outcomes that can occur during this transitional stage of life to identify gaps in the literature. This will help inform the development of appropriate prevention and intervention strategies for the treatment of alcohol use problems (Guttmannova et al., 2011).

Finally, while childhood adversity has been identified as a risk factor for problematic alcohol use across the literature (Bellis et al., 2019; Petruccelli et al., 2019), the effects of perceived stress and disengagement coping strategies as mediators between childhood adversity and alcohol use in emerging adults is not understood and has not been tested as mediators in the same model. Further research is needed to expand on initial findings and to understand the role of perceived stress and coping in the relationship between childhood adversity and problematic alcohol use. Previous research suggests that heightened stress perception and the use of disengagement coping strategies are likely to be adaptive strategies for children when faced with stress (Blair & Raver, 2012; Masten & Cicchetti, 2010; Wadsworth, 2015). Sensitization to stress and coping strategies that protect a child from danger may become favoured and established well into adulthood (Blair & Raver, 2012; Masten & Cicchetti, 2010; Wadsworth, 2015). As a result,

individuals with a history of childhood adversity maintain a heightened perception of stress and limited coping strategies that are ineffective in regulating normative daily stressors that are experienced later in life (LoPilato et al., 2020). This study will shed light on the negative and persistent effects of childhood adversity on stress sensitization and health outcomes in a sample of individuals with a range of presenting stress levels and coping strategies. While previous intervention efforts have focused on managing responses to specific acute stressors, it is worthwhile to consider the long-lasting impact of childhood adversity on an individual's subjective experience of recent stress and use of disengagement coping strategies. The results from the proposed study has the potential to help guide targeted interventions that address the needs of adults for reducing their perceived stress and improving their coping skills.

## Present Study

Exposure to stressors is unavoidable, especially among emerging adults who are undergoing rapid changes in social context. However, stress is manageable given the right tools. Childhood adversity can trigger stress responses and changes in brain functioning and physiology that undermine self-regulation of stress and heightens vulnerability for adopting and using maladaptive coping strategies (Forster et al., 2018). An individual cannot change his or her family history, genetics, or childhood risk factors that increase the proclivity for problematic alcohol use, but he or she may learn to engage in effective coping strategies that reduce experiences of stress without negative consequences. This study will investigate the continued pernicious effects of childhood adversity on alcohol use behaviours during a stressful period in the lives of emerging adults. Given the salience of stress in the lives of many post-secondary students, the ways that students cope with stress may be a critical factor in determining who is

adversely affected and may serve as a target for interventions to increase resiliency and prevent drug misuse.

Research suggests that there are complex interrelationships among childhood adversity, perceived stress, coping strategies and alcohol use. However, an integrative model exploring the role of stress and disengagement coping strategies in the association between childhood adversity and alcohol use has yet to be tested among emerging adults. Given the lack of research examining the impact of childhood adversity on stress sensitization and its role on alcohol use behaviours, the proposed study seeks to investigate the question: Does greater perceived stress and disengagement coping strategies explain the relationship between childhood adversity and alcohol use and ARP among emerging adults?

**Hypotheses**

In my hypothesized models, I predict that childhood adversity will be associated with greater perceived stress which will contribute to greater use of disengagement coping responses, both of which will contribute to greater alcohol consumption (frequency [Figure 1] and quantity [Figure 2]) and alcohol related problems (Figure 3). In these models, childhood adversity is predicted to contribute directly to increased perceived stress, increased disengagement coping responses, and alcohol consumption and problems. Increased stress is hypothesized to contribute to increased disengagement coping responses and alcohol consumption and problems, and disengagement coping strategies is predicted to contribute to increased alcohol consumption and problems. Based on the existing theories and empirical literature reviewed above, I hypothesize that childhood adversity will indirectly affect alcohol consumption and problems through perceived stress and disengagement coping responses. These indirect effects test the assertion that exposure to childhood adversity negatively impacts development by sensitizing individuals to stress in adulthood which brings about the use of disengagement coping strategies that results in a problematic pattern of alcohol consumption and alcohol related problems during emerging adulthood.

# Method

## Participants

Students attending Lakehead University ($N$ = 153) in Thunder Bay, Ontario were recruited for the study. Given that the emerging adulthood age range (18-29) was of particular interest for the proposed study, one student outside of this age range was excluded from the sample. Upon inspection of the data, two participants were missing survey data and were removed, resulting in a final sample of 150 students (130 female participants) with a mean age of 20 years ($SD$ = 2.72). A detailed description of the data cleaning procedure is provided in the results section. Participants identified primarily as White (67.6%) and others identified as Asian (9.5%), Black (8.1%), Indigenous (6.8%), or Other (8.0%). Participants were recruited through a number of avenues including posters (see Appendix A), emails to course instructors, and through SONA (Lakehead University's online psychology student recruitment system). The eligibility criteria for the proposed study required participants to speak and read fluently in English, have access to internet, and have consumed alcohol in the past 30 day.

## Procedure

Ethical approval was obtained from the Lakehead University Research Ethics Board. Upon expressing interest in the study via the recruitment methods, students wishing to participate were asked to attend an online orientation session (via Zoom). Prior to the orientation session, students were emailed the information letter for the study (see Appendix B) and sent an email reminder to attend the session. The email reminder contained the participant's ID number, and a zoom link for the orientation session (see Appendix C). Participation in the study was anonymous. During the orientation session, students were provided with information about the study verbally (consistent with the information letter). Then students were invited to provide

consent via an online consent form on Survey Monkey (see Appendix D). The informed consent process took place in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of & Canada, and Social Sciences and Humanities Research Council of Canada, 2014) and Lakehead University's Research Ethics Board. Upon providing consent, participants were instructed to enter their Participant ID and follow the link embedded within Survey Monkey to access the online Alcohol Timeline Follow Back (see Appendix E). Participants were instructed to again enter their Participant ID and a personally created password to access the Alcohol Timeline Follow Back. A member of the research team provided information on how to complete the Alcohol Timeline Follow Back during the orientation session and supported participants in completing it. Upon completing the Alcohol Timeline Follow Back, participants were instructed to complete the remaining surveys by returning to the original Survey Monkey link (where they provided consent, entered their Participant ID, and received the link to the Alcohol Timeline Follow Back).

The total duration for participants to complete all study requirements was approximately 75 - 90 minutes. Participants received 1.5 bonus points towards an eligible psychology course. Given that some questions ask participants to report on possible difficult life experiences, potential transient risk may occur (e.g., temporary emotional reaction to a survey question). To mitigate this potential risk, participants were informed in all recruitment/advertising materials and during the informed consent process that some survey items will ask about difficult experiences they may have had and that some of these questions may be hard to think about. Participants were informed that they are not required to answer all questions and could skip questions that they did not feel comfortable answering. Additionally, information about

university supports (e.g., Student Health and Counselling) and community supports (e.g., Crisis Response; Walk-In Counselling; Good2Talk) was provided to participants in the information letter and they were encouraged to contact these supports if they feel upset during or following their participation in the study.

## Measures

### *Adverse Childhood Experiences Questionnaire (ACEs).*

The Adverse Childhood Experiences questionnaire (Felitti et al., 1998; Frewen et al., 2019; Appendix F) was used to assess the occurrence of five types of child maltreatment (i.e., physical abuse, sexual abuse, emotional abuse, emotional neglect, and physical neglect) and five types of household challenges (i.e., parental divorce, mother treated violently, household mental health problems, household substance use, and household incarceration). Sample items include "*Did a parent or other adult in the household often or very often swear at, insult, or put you down?*" and "*Did a parent or other adult in the household often or very often push, grab, shove, or slap you?*" The response options are "*Never*", "*At least once*", and "*Many times*" (Frewen et al., 2019). For the proposed study, each item on the 10-item measure will be coded dichotomously, representing the presence (1) of an ACE as indicated by an answer of "At least once" or "Many times," or absence (0) of an ACE as indicated by an answer of "Never." The 10-item ACEs Questionnaire demonstrates good test-retest reliability with correlation values greater than or equal to .65 (6 months; Pinto et al., 2014) and correlates with an inventory of lifetime traumatic exposure, demonstrating construct validity ($r$ = .69; Frewen et al., 2019). Researchers studying ACEs have identified other sources of childhood adversity beyond the traditional ten items assessing abuse and/or neglect, such as experience of bullying, racism, community violence, spanking, peer victimization, household gambling problems, foster care placement, poverty, and neighbourhood safety in childhood (Afifi et al., 2020). These additional items were

included in the data collection. An ACE score, ranging from 0 to 17, was created by summing the number of ACEs item endorsed on the original questionnaire (Fox et al., 2015; Perez et al., 2016, 2018) along with the additional ACEs informed by Afifi and colleagues (2020) work. Higher total scores will indicate more ACEs.

***Perceived Stress Scale – 10 (PSS-10).***

The 10-item Perceived Stress Scale (Cohen et al., 1983; Appendix G) is a widely-used measure of stress appraisal of events from the previous month (30 days). Responses range from 0 ("*Never*") to 4 ("*Very often*") and are used to measure the frequency and severity of perceived stress, with 4 indicating the highest level of stress. Sample items include "*In the last month, how often have you been upset because of something that happened unexpectedly?*" and "*In the last month, how often have you felt that you were unable to control the important things in your life?*" For the study, items were summed to obtain a total score, with greater scores indicating higher levels of perceived stress in alignment with the scoring guidelines proposed by Cohen and colleagues (1983). The PSS-10 has good internal consistency (Cronbach's $\alpha = 0.78$ to 0.84; Eskildsen et al., 2015; Lesage et al., 2012; Nordin & Nordin, 2013; Remor, 2006; Roberts et al., 2011) and test–retest reliability correlations ranging from .85 (2 days; Roberts et al., 2011) to .74 (2 weeks; Remor, 2006) to 0.55 (6 weeks; Roberts et al., 2011).

***Coping Strategies Inventory (CSI).***

The Coping Strategies Inventory (Tobin et al., 1984, 1989; Appendix H) is a 72 item self-report measure that assesses the ability to cope with stressful situations. This questionnaire is composed of eight primary subscales describing different coping strategies (i.e., problem solving, cognitive restructuring, social support, express emotions, problem avoidance, wishful thinking, social withdrawal, and self-criticism), with 9 items per scale. Individual coping strategies broadly categorize into two tertiary coping approaches used to manage stressful

situations: disengagement coping which involves coping activities that disengage the individual from the situation and engagement coping which involves active and ongoing negotiation with the stressful environment (Tobin et al., 1989). For the purposes of this study, hypothesis testing was restricted to the tertiary disengagement level. Sample items include "*I slept more than usual*", "*I hoped the problem would take care of itself*", and "*I told myself that if I wasn't so careless, things like this wouldn't happen.*" Current scoring practices for the CSI involve giving all items in a particular subscale (primary, secondary or tertiary) equal weights. For the purposes of this study, responses for all items in the disengagement tertiary subscale were summed, with higher scores indicating the use of more disengagement coping strategies. The alpha coefficient for the disengagement scale is 0.89 (Tobin et al., 1984). Additionally, the disengagement scale demonstrates an acceptable test-retest reliability of 0.79 (2 weeks; Tobin et al., 1984).

***Alcohol Use Consumption.***

For all assessments, a standard drink was defined as a 12 oz. beer or cider/cooler; 8-9 ox malt liquor; 5 oz. glass of wine; or 1.5 oz. shot of hard liquor either straight or in a mixed drink, all equivalent to approximately .6 oz or 14 grams of pure alcohol (Butt et al., 2011; CCSA, 2018; National Institute on Alcohol Abuse and Alcoholism, 2005; Appendix I). The online Alcohol Timeline Follow Back (TLFB) method (Sobel & Sobel, 2003; Wray et al., 2019) was used to assess drinking behaviour, providing estimates of the distribution of drinking days and the amount of daily alcohol consumption in the last 30 days. Based on prior research (Vakili et al., 2008), reference periods as short as one month provide reasonable estimates of drinking rates. In this procedure, a computerized calendar for the previous month was shown to the participant which has demonstrated to be comparable to the paper and pencil version of the alcohol TLFB (Pedersen et al., 2012; Sobel & Sobel, 2003; Sobell et al., 1996; Wray et al., 2019). Significant events (e.g., birthdays, holidays) were marked on the calendar by the participant to facilitate

recall of the days in which alcohol was used. After calendars are constructed, participants were instructed to indicate, on the calendar, which days involved the consumption of alcohol, as well as the number of alcoholic beverages consumed per drinking day. The purposed study used two alcohol use variables typically obtained using this method to assess drinking behaviour. The first is drinking frequency which will be derived by counting the number of days that a participant consumed alcohol in the past month (Roy et al., 2008; Sobell et al., 2003). The second variable is drinking quantity which was derived by summing the total number of drinks in the past month (Roy et al., 2008; Sobell et al., 2003). The online TLFB has demonstrated high correlations with an alcohol daily diary across a 30-day period ($r = 0.55 – 0.88$) and moderate to strong correlations ($r = 0.50 – 0.59$) with measures of drinking from the Alcohol Use Disorder Identification Test (Saunders et al., 1993; Wray et al., 2019). The TLFB has high test–retest reliability across multiple populations of drinkers with correlations ranging from 0.68 to 0.98 (Carey et al., 2004; Cohen & Vinson, 1995; Roy et al., 2008; Sobell et al., 2003; Vakili et al., 2008) and demonstrates comparable estimates of drinking rates to other measures of alcohol consumption ($r = 0.60$ to .82; Roy et al., 2008; Sobell et al., 2003).

***Alcohol Related Problems.***

The Brief Young Adult Alcohol Consequences Questionnaire (YAACQ; Kahler et al., 2005; Appendix J) is a 24-item scale that assesses a broad range of alcohol consequences that young adults may experience in a given time frame (e.g., past year, past 6 months, past month). Sample items include "*While drinking, I have said or done embarrassing things*" and "*I have had a hangover (headache, sick stomach) the morning after I had been drinking.*" These 24 items assess eight domains of consequences (social/interpersonal, academic/occupational, risky behaviour, impaired control, poor self-care, diminished self-perception, blackout drinking, physiological dependence), all of which load on a single, higher-order consequences factor.

Response options are rated dichotomously (0 = "*no*" and 1 = "*yes*") based on whether the individual experienced that consequence in the past month. Based on prior research (Kahler et al., 2005; Read et al., 2006), the total score (0 – 24) is computed to reflect the total number of consequences that an individual experienced in the past month. In a validation study of the 30 day version of the brief YAACQ (Kahler et al., 2008), the Cronbach's alpha ranged from 0.84 (baseline) to 0.89 (6 week follow-up) and a test–retest reliability of 0.70 (6 weeks). Other studies using a one year time period report alpha coefficients ranging from 0.82 to 0.89 and high correlations with other measures of harmful alcohol use ($r$ = 0.75 – 0.78; Kahler et al., 2005; Verster et al., 2009).

**Data Analyses**

A serial multiple mediation model was used to test the hypotheses that perceived stress and disengagement coping strategy mediate the relationship between childhood adversity and alcohol use and alcohol related problems among emerging adults. In a serial mediation model, the effect of an independent variable ($X$) on a dependent variable ($Y$) is explained through two or more variables called mediators ($M_i$; Hayes, 2022). Compared with the traditional mediation method, a serial multiple mediation model enables researchers to simultaneously analyze two or more mediators and can provide values for each model path and account for other model paths (Hayes, 2022).

Specific to the proposed study, a serial mediation analysis allows for perceived stress and disengagement coping strategies to be examined as mediators, while testing the impact of childhood adversity on alcohol frequency, quantity, and ARPs in three different models (Figure 1-3). All data analyses were conducted using version 28 of IBM SPSS Statistics. The models were tested using PROCESS model 6 (Hayes, 2022) which determines the significance of

mediators within a specified order via bootstrap confidence intervals for all indirect effects as well as all possible pairwise comparisons between indirect effects. The indirect, direct, and total effects of childhood adversity on alcohol frequency, quantity, and ARPs via the two mediators (perceived stress and disengagement coping) were determined. Hayes (2022) recommended 5,000 bootstrap samples to be used for mediation analyses in the test from Serial-Multiple Mediation Model 6. Thus, data obtained from 5,000 bootstrap samples were used in the proposed study. If the 95% confidence interval of the outcome of the mediation effect does not contain zero, then the mediation effect would be significant at the 0.05 level. The statistical model of a serial multiple mediator model contains one direct effect and three indirect effects of childhood adversity on alcohol consumption and problems. The proposed serial multiple mediation model specified childhood adversity ($X$) → perceived stress ($M_1$) → disengagement coping strategy ($M_2$) → alcohol frequency, quantity, and problems ($Y$) (see Figure 1-3). The first indirect effect is the specific indirect effect of childhood adversity on the three alcohol outcome variables through perceived stress ($X \rightarrow M_1 \rightarrow Y$), estimated as $a_1b_1$. The second specific indirect effect is the indirect effect of childhood adversity on the three alcohol outcome variables through disengagement coping strategy ($X \rightarrow M_2 \rightarrow Y$), estimated as $a_2b_2$. The third indirect effect is the specific indirect effect of childhood adversity on the three alcohol outcome variables through perceived and disengagement coping strategy in serial, with perceived stress modeled as effecting disengagement coping strategies, which in turn influences alcohol consumption and problems ($X \rightarrow M_1 \rightarrow M_2 \rightarrow Y$), estimated as $a_1d_{21}b_2$. Sex and age were included as covariates in the analysis (Nolen-Hoeksema, 2004; Wilsnack & Wilsnack, 2002).

In studying relationships between childhood adversity, perceived stress, maladaptive coping strategies and alcohol outcomes, a number of covariates were considered in the analyses.

Sex was considered as a potential covariate because research indicates sex differences with respect to alcohol use and how individuals with childhood adversity use respond to stressful situations (Evans et al., 2017; McLaughlin et al., 2010; Mereish et al., 2014; Myers et al., 2014; Young-Wolff et al., 2012). Women tend to seek social support, accept responsibility and escape when faced with stressful situations more than men (Pelissier & Jones, 2006; Timko et al., 2005). Additionally, age was considered as a potential covariate because the literature indicates age differences in how individuals experience and cope with stress (Aldwin et al., 1996; Hampel & Petermann, 2006; Johnson & Pandina, 1993).

## Results

### Data Cleaning

Two participants were missing data for the study variables and two participants were missing data for drinking consumption. The amount of missing data was minimal (1.3-2.6% across scale items). Alcohol quantity (i.e., number of drinks consumed per drinking day) was missing for seven participants. A non-significant Little's MCAR test (Little, 1988; Osborne, 2013) showed that the data were missing completely at random for measures of childhood adversity, perceived stress, coping strategies and ARPs. The tests were followed up with an observation of missing patterns in SPSS (Tabachnick & Fidell, 2001). The overall summary of missing values and missing value patterns showed that minimal data were missing and there were no distinct patterns of missing data. In cases where the missing data was not substantial (10% or less; Dong & Peng, 2013; Madley-Dowd et al., 2019), missing items were imputed using mean substitution (Tabachnick & Fidell, 2013).

Skewness and kurtosis for the study measures are summarized in Table 1. Childhood adversity, CSI and BYAACQ were positively skewed with a kurtosis less than one, indicating

that the distribution of the variables is skewed to the right and have thinner tails than a normal distribution. Perceived stress was negatively skewed with as kurtosis value less than one. Kolmogorov–Smirnov (K-S) tests (Berger & Zhou, 2014) and Levene's tests (Levene, 1960) were computed prior to statistical analyses to test for normal distribution as well as equality of variances of all study variables. The K-S test for PSS ($D(150) = .08$, $p = .02$) and SI ($D(150) = .08$, $p = .02$) did not deviate significantly from normal; however, childhood adversity ($D(148) = .13$, $p < .001$) and BYAACQ ($D(150) = .15$, $p < .001$) scores were both significantly non-normal (see Table 2). The result of Levene's test was not significant for any of the study variables (see Table 3).

Table 1.

*Skew and Kurtosis of the Study Variables (N = 150)*

| | Skew (*SE*) | Kurtosis (*SE*) |
|---|---|---|
| ACE | .98 (.20) | .82 (.40) |
| PSS-10 | -.27 (.20) | -.44 (.39) |
| CSI | .04 (.20) | -.84 (.40) |
| BYAACQ | .80 (.20) | .10 (.40) |

*Note.* ACE = Adverse Childhood Experiences; PSS-10 = Perceived Stress Scale-10; CSI = Coping Strategies Inventory; BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire.

Table 2.

*Tests of Normality of the Study Variables*

| | $D^a$ | df | *p* |
|---|---|---|---|
| ACE | .127 | 150 | <.001 |
| PSS-10 | .079 | 150 | .024 |

| | | | |
|---|---|---|---|
| CSI | .075 | 150 | .039 |
| BYAACQ | .145 | 150 | <.001 |

*Note.* Kolmogorov-Smirnov test of normality; ACE = Adverse Childhood Experiences; PSS-10 = Perceived Stress Scale-10; CSI = Coping Strategies Inventory; BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire.

[a] *Lilliefors Significance Correction*

Table 3.

*Test of Homogeneity of Variance of Study Variables*

| | Levene Statistic | *df*1 | *df*2 | *p* |
|---|---|---|---|---|
| ACE | .268 | 1 | 148 | .605 |
| PSS-10 | .160 | 1 | 148 | .690 |
| CSI | .326 | 1 | 148 | .569 |
| BYAACQ | .001 | 1 | 148 | .926 |

*Note.* ACE = Adverse Childhood Experiences; PSS-10 = Perceived Stress Scale-10; CSI = Coping Strategies Inventory; BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire.

Sixty-eight univariate outliers were identified outside of the *z* score range (+/- 3.29, $p < .001$; Tabachnick & Fidell, 2013) among the study measures. Thirty of the univariate outliers were identified in the ACEs measure. Upon further inspection, the items identified were a proper representation of the sample (e.g., seven participants endorsed experiencing item five, physical neglect, many times in their childhood) and were not modified to avoid issues with interpretation. Most of the remaining outliers were identified in the BYAACQ measure. Given that the BYAACQ response items are dichotomous (i.e., “yes” or “no”), items were not modified

to reduce issues related with interpretation and loss of data. No variable transformations were performed to avoid issues with the interpretation of transformed variables. Six outliers were identified outside of the z score range in the alcohol frequency data and were not included in the analysis conducted below (Tabachnick & Fidell, 2013) given that values could not be approximated based on drinking values provided (i.e., insufficient amount of data to compute mean substitution).

**Descriptive Statistics**

Descriptive statistics across participants are provided in Table 4. Information on ethnicity was missing for two participants and information on age was missing for one participant. Means, standard deviations, and alpha reliabilities for the study measures are summarized in Table 5.

In terms of trauma exposure, 86% of participants reported at least one ACE when examining the original ten ACEs (Felitti et al., 1998). This is higher than expected in comparison to a large scale sample of Canadian adults (55.8%; Carsley & Oei, 2020), however comparable to rates reported in a similar sample of Canadian university students (79.61%; MacIsaac et al., 2021). With the additional seven ACE items (Afifi et al., 2020), prevalence rates of ACEs increased to 94.67%, with participants endorsing 2.61 items more, on average (see Table 5). Overall, participants on average endorsed 4.48 ACE items on the original 10 item ACE measure and 7.06 ACE items on the 17 item ACE measure.

Table 4.

*Demographic characteristics*

| Measure | *%* | *M* |
|---|---|---|
| Age[a] | | 20.66 (2.72) |
| Sex (% Female) | 86.7 | |

| | |
|---|---|
| Ethnicity[a] | |
| White/European | 67.6 |
| Black | 8.1 |
| Indigenous | 6.8 |
| Asian | 9.5 |
| Other | 8.0 |
| Year of study | |
| First year | 46.0 |
| Second year | 11.3 |
| Third year | 26.0 |
| Fourth year | 13.3 |
| Fifth or more | 3.3 |
| Employment | |
| Full-time | 5.3 |
| Part-time | 62.7 |
| Unemployed | 32.0 |

[a] *Demographic data could not be obtained for 3 participants*

Table 5.

*Means, Standard Deviations, and Cronbach Alpha Values for Study Variables (N = 150)*

| Scale | *M* | *SD* | Cronbach's Alpha |
|---|---|---|---|
| ACEs (Original) | 4.48 | 4.20 | .81 |
| Additional ACEs | 2.61 | 2.15 | .55 |

| | | | |
|---|---|---|---|
| ACEs (Original + Additional) | 7.09 | 5.55 | .82 |
| PSS-10 | 23.15 | 6.47 | .86 |
| CSI | 99.09 | 28.89 | .94 |
| BYAACQ | 5.50 | 4.05 | .82 |

*Note.* ACEs (Original) = Adverse Childhood Experiences as measured by the Adverse Childhood Experiences Questionnaire; ACEs (Original + Additional) = Total number of adverse childhood experiences as measured by the Adverse Childhood Experiences Questionnaire with the additional ACE questions; PSS-10 = Perceived Stress Scale-10; CSI = Coping Strategies Inventory; BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire.

Participant consumed alcohol on an average of 5.55 days (SD = 4.05, min = 1, max = 30) over the past 30 days. HED was endorsed by 74.82% ($n$ = 104) of the participants. Participants engaged in an average of 2.01 ($N$ = 139, $SD$ = 1.78, min = 0, max = 8) HED sessions in the past 30 days. Furthermore, participants consumed an average of 20.38 drinks ($N$ = 137, $SD$ = 15.11, min = 1, max = 78) over the past 30 days.

**Bivariate Correlations**

Bivariate correlations were computed between age, sex and measures of childhood adversity (i.e., ACE), perceived stress, maladaptive coping strategies (i.e., CSI) and alcohol consequences (BYAACQ; see Table 6). Age was positively and significantly associated with childhood adversity. As expected, childhood adversity measures were significantly and positively correlated with perceived stress, maladaptive coping strategies, and alcohol consequences. Similarly, perceived stress was significantly and positively correlated with maladaptive coping strategies. As predicted, perceived stress was significantly associated with

the BYAACQ alcohol consequences measure. The maladaptive coping strategies measures were positively associated with alcohol consequences.

Unexpectedly, drinking frequency was not significantly associated with any of the study variables. Total number of HED days in the past 30 days was positively and significantly associated with ARPs and total number of drinking days. Similarly, total number of drinks consumed in the past 30 days was positively and significantly associated with ARPs, total number of drinking days and HED days, but no other study variable.

Table 6.

*Bivariate Correlations of Covariates and Study Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Age | --- | -.037 | .217** | .085 | .043 | .145 | .153 | -.101 | .034 |
| 2. Sex | --- | --- | -.042 | -.063 | .006 | -.131 | .094 | .047 | .027 |
| 3. ACE | --- | --- | --- | .469** | .350** | .235** | .048 | .033 | .150 |
| 4. PSS-10 | --- | --- | --- | --- | .523** | .185* | .038 | -.144 | .018 |
| 5. CSI | --- | --- | --- | --- | --- | .267** | .010 | .042 | .130 |
| 6. BYAACQ | --- | --- | --- | --- | --- | --- | .135 | .299** | .412** |
| 7. Drinking Days | --- | --- | --- | --- | --- | --- | --- | .448** | .624** |
| 8. HED Days | --- | --- | --- | --- | --- | --- | --- | --- | .804** |
| 9. Total Drinks | --- | --- | --- | --- | --- | --- | --- | --- | --- |

*Note.* ACE = Adverse Childhood Experiences; PSS-10 = Perceived Stress Scale-10; CSI = Coping Strategies Inventory; BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire; Drinking Days = Total number of drinking days in the past 30 days; HED Days =

Total number of heavy episodic days in the past 30 days; Total Drinks = Total number of drinks consumed in the past 30 days.

*$p < .05$; **$p < .01$

**Mediation Analyses**

I hypothesized that perceived stress and maladaptive coping strategies may help explain the relationship between childhood adversity and alcohol use and consequences. As mentioned, data on alcohol consumption was incomplete and, therefore, not included in the analyses below. Before conducting the mediation analysis, a common method bias test was conducted (Podsakoff et al., 2003, 2012). The simplest ways to test for common method bias is by using the Harman's single factor score in which all items are loaded into one common factor. If the total variance for a single factor is less than 50%, it suggests that common method bias does not affect the data (Podsakoff et al., 2003, 2012). The variance of the first factor was 29.27%, less than the critical value (i.e., 50%) examined by Harman's single-factor test, which indicated no serious common method bias in the present study. In order to calculate the direct and indirect effect of such mediating relationships, Model 6 of the PROCESS macro of Hayes (2022) was used. All coefficients, standard errors and *p* values, are depicted in Table 7 (i.e., alcohol frequency) and 8 (i.e., alcohol consequences) and path coefficients are illustrated in Figure 5 (i.e., alcohol frequency; see appendix) and 6 (i.e., alcohol consequences; see appendix).

***Alcohol Frequency***

The total serial indirect effect of childhood adversity on alcohol frequency via perceived stress and maladaptive coping strategies was insignificant (pathway $a_1d_{21}b_2$: β = -.003, *SE* = .015, 95% CI [-.033, .025]) meaning that there was no predictive relationship between ACEs and alcohol frequency when perceived stress and disengagement coping strategies were added as

mediators in this relationship. The specific indirect effects for childhood adversity on alcohol frequency via perceived stress (pathway $a_1b_1$: β = .013, *SE* = .035, 95% CI [-.052, .085]) and maladaptive coping strategies (pathway $a_2b_2$: β = -.002, *SE* = .012, 95% CI [-.027, .019]) was not statistically significant meaning that neither perceived stress or disengagement coping strategies mediated the relationship between ACEs and alcohol frequency. Within this model, the direct effect of childhood adversity on alcohol frequency was not significant (pathway *c'*: β = .006, *SE* = .07, *t*(141) = 086, *p* = .932) which indicates that ACEs does not significantly predict changes in alcohol frequency scores. The total effects of childhood adversity on alcohol frequency were also not significant (pathway *c*: β = .014, *SE* = .061, *t*(143) = .223, *p* = .824), which again suggests that ACEs have no significant impact on alcohol frequency when mediated by perceived stress and disengagement coping strategies. The model explained 3.44% of the variance in alcohol frequency, *F*(4, 141) = 1.01, *p* = .42.

Table 7.

*Regression Coefficients, Standard Errors, and Model Summary Information for the Alcohol Frequency Data Serial Mediation Model*

| | | Consequent | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PSS | | | | CSI | | | | Alcohol Frequency | |
| | | β | *SE* | *p* | | β | *SE* | *p* | | β | *SE* | *p* |
| ACE | $a_1$ | .53 | .09 | <.001 | $a_2$ | .81 | .42 | .06 | $c'$ | .01 | .07 | .93 |
| PSS-10 | | --- | --- | --- | $d_{21}$ | 2.04 | .36 | < .001 | $b_1$ | .02 | .07 | .72 |
| CSI | | --- | --- | --- | | --- | --- | --- | $b_2$ | -.00 | .01 | .85 |
| Age | | -.041 | .178 | .820 | | -.291 | .761 | .702 | | .226 | .126 | .074 |
| Sex | | -.818 | 1.41 | .563 | | 3.89 | 6.04 | .521 | | 1.22 | .998 | .223 |

| | | |
|---|---|---|
| $R^2 = .22$ | $R^2 = .29$ | $R^2 = .03$ |
| $F(3,143) = 13.03, p < .001$ | $F(4,142) = 14.63, p < .001$ | $F(5,141) = 1.01, p = .42$ |

*Note.* ACE = Adverse Childhood Experiences; PSS-10 = Perceived Stress Scale-10; CSI = Coping Strategies Inventory; B = Unstandardized Regression coefficients; SE = Standard Error

***Alcohol Related Problems***

The total serial indirect effect of childhood adversity on ARPs via perceived stress and maladaptive coping strategies was significant (pathway $a_1d_{21}b_2$: β = -.038, *SE* = .016, 95% CI [.011, .077]). This suggests there is a positive predictive relationship between ACEs and ARPs, as mediated by perceived stress and disengagement coping strategies.

The specific indirect effects for CA on ARPs via perceived stress (pathway $a_1b_1$: β = -.007, *SE* = .034, 95% CI [-.074, .06]) was not significant but was significant via disengagement coping strategies (pathway $a_2b_2$: β = .029, *SE* = .016, 95% CI [.001, .065). This indicates that disengagement coping strategies significantly mediates the relationship between ACEs and BYAACQ and perceived stress does not mediate the relationship between ACEs-BYAACQ. Within this model, the direct effect of childhood adversity on ARPs was not significant (pathway *c'*: β = .085, *SE* = .066, $t(141) = 1.29$, $p = .199$). Furthermore, the total effects of childhood adversity on ARPs were significant (pathway *c*: β = .145, *SE* = .059, $t(143) = 2.444$, $p = .016$) suggesting that perceived stress and disengagement coping strategies jointly mediate the relationship between childhood adversity and ARPs. The model explained 12.90% of the variance in ARPs, $F(4, 141) = 4.18$, $p = .001$.

Table 8.

*Regression Coefficients, Standard Errors, and Model Summary Information for the Alcohol Consequence Data Serial Mediation Model*

| | | Consequent | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PSS | | | | CSI | | | | BYAACQ | |
| | | β | *SE* | *p* | | β | *SE* | *p* | | β | *SE* | *p* |
| ACE | $a_1$ | .53 | .09 | <.001 | $a_2$ | .81 | .42 | .06 | $c'$ | .09 | .07 | .20 |
| PSS-10 | | --- | --- | --- | $d_{21}$ | 2.04 | .36 | <.001 | $b_1$ | -.01 | .06 | .83 |
| CSI | | --- | --- | --- | | --- | --- | --- | $b_2$ | .04 | .01 | .01 |
| Age | | -.041 | .178 | .820 | | -.291 | .761 | .702 | | .154 | .118 | .192 |
| Sex | | -.818 | 1.41 | .563 | | 3.89 | 6.04 | .521 | | -1.54 | .936 | .102 |
| | | $R^2$= .22 | | | | $R^2$= .29 | | | | $R^2$= .13 | | |
| | | $F(3,143) = 32.87, p <$ .001 | | | | $F(4,142) = 14.63, p < .001$ | | | | $F(5,141) = 4.31, p = .001$ | | |

*Note.* ACE = Adverse Childhood Experiences; PSS-10 = Perceived Stress Scale-10; CSI = Coping Strategies Inventory; B = Unstandardized Regression coefficients; SE = Standard Error

## Discussion

The present study examined potential mechanisms by which adverse childhood experiences were associated with alcohol outcomes among young adults utilizing a serial mediation model to investigate the roles of perceived stress and disengagement coping strategies. Research has demonstrated that individuals who experienced childhood adversity are at an increased risk for problematic alcohol use, often persisting into adulthood (Dube et al., 2002, 2003; Felitti et al., 1998; Ramos-Olazagasti et al., 2017). It was hypothesized that increased ACE scores would predict increased perceived stress, which in turn would predict higher disengagement coping strategies scores, which would then predict the following outcomes: 1) alcohol frequency (i.e., total number of drinking days in the past 30 days, 2) alcohol quantity

(i.e., the average number of drinks consumed per occasion in the past 30 days), and 3) alcohol related problems.

The indirect effects of the serial mediation path were significant for alcohol-related consequences. Specifically, this model explained approximately 13% of the variance in alcohol related problems. These findings support the theory that childhood adversity may result in a greater sensitivity to stress and difficulties regulating stress, resulting in more alcohol-related consequences (Park & Levenson, 2002; Tyssen et al., 1998). In addition, the analyses showed that perceived stress and disengagement coping styles have somewhat different relationships with alcohol related problems. When controlling for disengagement coping styles, perceived stress was not a significant mediator of the relationship between childhood adversity and alcohol related problems. However, controlling for perceived stress, disengagement coping strategies remained a significant mediator for the ACEs-ARPs relationship. This pattern is consistent with other evidence showing that even in the absence of perceived stress, disengagement coping styles are associated with alcohol related problems(Hogarth et al., 2019; Shin et al., 2020; Zaso et al., 2021).

The present study and previous investigations support the theory that adverse events early in life may be a particular source of distress that enforces the use of disengagement coping strategies and self-regulation of distress via alcohol. Disengagement coping styles, once developed, may remain relatively stable during development, and persist into adulthood, increasing the risk for subsequent adverse alcohol outcomes. On the other hand, perceived stress may not be pertinent in explaining the relationship between childhood adversity and later alcohol related problems. Previous research has primarily examined longer-term associations of childhood adversity on alcohol outcomes by examining recent stress events rather than perceived

stress (Keyes et al., 2014; J. H. Kim et al., 2014; Young-Wolff et al., 2012). Among individuals with a history of childhood adversity, recent stressful life events may be a better indicator of distress than perceived stress. As such, future research would benefit from examining the relationship between childhood adversity and alcohol outcomes through recent stressful events to characterize more persisting effects of early experiences of adversity on stress sensitization and management.

This is the first study, to my knowledge, that tests the application of the stress sensitization hypothesis to alcohol related outcomes. There are several potential explanations for the greater stress related experiences of harmful alcohol outcomes among emerging adults exposed to childhood adversity. These potential mechanisms can be conceptualized as operating at several biological and psychological levels. childhood adversity can affect brain development in ways that increase vulnerability to substance use, sensitivity to stress, and decreased capacity to cope with stress. For example, childhood adversity have been associated with altered cortisol reactivity in relation to stress in adulthood (Carpenter et al., 2009; Sinha, 2008) and structural alterations in the orbitofrontal, dorsolateral, and subgenual prefrontal cortex , and anterior cingulate cortices (Cohen et al., 2006; De Brito et al., 2013; Tomoda et al., 2009) that are associated with individual stress-response systems. Those emerging adults who have impaired neurocognitive functioning because of childhood adversity may experience difficulties in handling and modulating stress. Similarly, childhood adversity has consistently been associated with maladaptive coping strategies. Previous research has demonstrated that exposure to childhood adversity directly or indirectly contributes to developing and utilizing poorer coping strategies that could potentially add to stress-related drinking among emerging adults. Drinking alcohol to cope with stress is a maladaptive strategy that increases the risk of developing alcohol-

dependent habits (Sadava & Pak, 1993). Indeed, there is some evidence that tension reduction drinking motives mediate the association between childhood adversity and alcohol related problems among emerging adults (A. L. Goldstein et al., 2010; Mezquita et al., 2014; Shin et al., 2020). Therefore, drinking to cope with distress may be the primary mechanism behind the increased risk for alcohol related problems among emerging adults with a history of childhood adversity.

Results did not fully support all hypotheses, as perceived stress and disengagement coping strategies were not significant mediators of the relationship between childhood adversity and alcohol frequency. Alcohol misuse and alcohol related problems are major issues on university campuses in Canada. Alcohol use can vary anywhere from one drink to heavy alcohol use on any given occasion. As such, alcohol frequency measures provide information about alcohol use patterns but are not necessarily indicative of the consequences associated with alcohol consumption. Although alcohol consumption predicts adverse drinking consequences in students (Ham & Hope, 2003; Mallett et al., 2013), alcohol use explains less than 23% of the variance in alcohol related problems among post-secondary students (Prince et al., 2018). Furthermore, research suggests that the positive, linear relationship between stress and alcohol use may not be as robust as certain theories predict (e.g., tension-reduction hypothesis; McCreary et al., 1999; McCreary & Sadava, 1998) and that stress may be more predictive of a person's vulnerability to alcohol-related problems (McCreary & Sadava, 1998). For example, using structural equation modeling, McCreary and Sadava (2000) found that stress is more strongly predictive of an increased vulnerability to alcohol related problems than to alcohol use (i.e., even after controlling for the relationships between stress, affect and alcohol use) among young adults (i.e., 18-29 years old). Thus, in the present study, the model predicting alcohol frequency via

stress and disengagement coping was not significant, possibly because stress is more predictive of alcohol related problems rather than alcohol use as seen in previous literature.

The finding that childhood adversity and alcohol related problems are positively and significantly associated among emerging adults, specifically post-secondary students, adds to the alcohol research in this field. A recent study by Lee and Feng (2021) found that adverse childhood experiences were associated with higher levels of alcohol problems in Taiwanese undergraduate students (Lee & Feng, 2021). A meta-analysis by Norman and colleagues (2012) found that experiences of emotional abuse in childhood increased the likelihood of drinking related problems among adults. Similar to the present study findings, this study revealed that childhood adversity and alcohol consumption outcomes were not significantly associated among emerging adults (Norman et al., 2012), unlike previous studies in this age range (Y. H. Kim, 2017; Mersky et al., 2013; Windle et al., 2018). These unexpected findings may result from the large proportion of females in their participant sample. Previous studies have shown that women tend to drink less alcohol in general (Erol & Karpyak, 2015; Nolen-hoeksema & Hilt, 2006) and, therefore, may not be engaging in higher alcohol use in the present study. These findings may also be attributable to recall bias associated with using the online alcohol TLFB, which can reduce the accuracy of retrospective consumption measures (Dulin et al., 2017; Gmel & Daeppen, 2007). Future studies should recruit more male participants and utilize multiple measures of alcohol use (e.g., daily reports).

Emerging adults, particularly university students, undergo a unique transition period marked by novel stressors associated with independence in adulthood (i.e., financial pressure, social isolation; Arnett, 2005; Maggs, 1997; Schulenberg & Maggs, 2002) and experiences of greater perceived stress (Bell & Belicki, 1998; Hager & Runtz, 2012; Hyman et al., 2007). A

subsection of these individuals that endorsed adverse childhood experiences may endure heightened stress responses due to their early stressful experiences. In a study by Hong and colleagues (2018), maternal psychological maltreatment and childhood emotional neglect were significantly and positively correlated with perceived stress among young female adults in a U.S. college sample. Among non-post-secondary emerging adults, research demonstrates that adversity in childhood is significantly associated with higher perceived stress levels in emerging adulthood (Heinze et al., 2017; Zhang et al., 2020). Similarly, the present study finds that childhood adversity is positively and significantly associated with perceived stress among emerging post-secondary adults. This finding suggests that an individual's self-regulatory processes following early experiences of stress are important intervening variables through which childhood adversity may contribute to increased perceived stress. Furthermore, given the numerous role changes and additional responsibilities experienced in emerging adulthood, preoccupation with or sensitivity to daily stressors could impede normal development during this stage.

The present study also demonstrates that childhood adversity is positively and significantly associated with disengagement coping strategies among emerging post-secondary students. Thus, emerging adults use disengagement coping strategies to relieve the distress caused by childhood adversity in adulthood. The coping process is a critical component contributing to how individuals adapt to life stresses. Research on the relationships between childhood adversity, coping, and substance use outcomes are extensive and complex. Previous research on emerging adults consistently demonstrates that exposure to childhood adversity is associated with greater use of disengagement coping strategies among university women (Gibson & Leitenberg, 2001; Leitenberg et al., 2004). Furthermore, the use of maladaptive coping

mechanisms to avoid the experience of distress has consistently been associated with harmful alcohol use (Colder, 2001; Greeley & Oei, 1999; Wills & Hirky, 1996; Wills & Shiffman, 1985). These findings suggest that stress is linked to childhood adversity and that individuals who are particularly reactive to stress are prone to cope via drinking when alternative coping skills are not available or have been learned (Leonard & Blane, 1999). In contrast, active, adaptive coping strategies can reduce stress and psychological effects associated with childhood adversity (Luecken & Gress-Smith, 2010; Machado et al., 2020) in adulthood and be incorporated into prevention and intervention strategies.

Unlike prior studies, the present study found no relationship between alcohol consumption outcomes, such as heavy alcohol consumption (Keyes et al., 2012; Young-Wolff et al., 2012), and the study variables. The analysis of the bivariate correlations found that alcohol frequency was not significantly correlated with any of the variables. Similarly, alcohol quantity was not associated with any study variables except alcohol related problems. Given that the literature has consistently demonstrated a strong relationship between childhood adversity (Anda et al., 2002; Dube et al., 2002), perceived stress (Brady & Sonne, 1999; Cadigan et al., 2021; Johnson & Pandina, 1993; Metzger et al., 2018), and disengagement coping strategies (Blumenthal et al., 2016; McConnell et al., 2014; Metzger et al., 2017) with alcohol use, the online TLFB may not have been the most appropriate method to collect alcohol use data. A limitation of this measure is the potential to forget alcohol use in the past 30 days. Furthermore, participants' self-reported and retrospective reports on the TLFB may not have been truthful. Although previous research demonstrates reliability and validity evidence for the use of the online TLFB, including strong, significant positive correlations of drinking quantity and frequency estimates (Pedersen et al., 2012; Rueger et al., 2012), it does not necessarily support

the equivalence of modalities at the daily report level. Previous studies have found significant differences in daily correspondence rates (Carney et al., 1998; Searles et al., 2000). As such, future studies should utilize multiple measures of alcohol consumption, such as ecological momentary assessment or quantity-frequency estimation and compare the benefits of using real-time versus retrospective estimates.

**Implications**

Previous research has demonstrated that emerging adults report consuming alcohol and experiencing alcohol related problems more than any other age group (Hingson et al., 2002; Simons-Morton et al., 2016). In light of these findings, as well as the large body of research documenting alcohol outcomes among individuals with childhood adversity in the general population and post-secondary students, it would be justifiable to view students with adverse childhood experiences as a high-risk group who should be targeted for interventions aimed at improving health and well-being. Although this age group is characterized by a variety of transitions that contribute to feelings of stress and the development of maladaptive behaviours (Arnett, 2000, 2014; Pedrelli et al., 2015), it is also characterized by the opportunity to make dramatic changes in their lives and become free of family environments that may have been pathogenic (Arnett, 2005). Surprisingly, post-secondary students with adverse childhood experiences are more likely to seek help, including both professional and informal types of help (Karatekin, 2018; Karatekin & Ahluwalia, 2021). However, students with more childhood adversities are less willing to take active charge of their health, less likely to find interventions helpful, more likely to quit interventions prematurely, and more likely to report unmet health needs (Karatekin, 2018). Furthermore, individuals with a history of adversity are more motivated to attend interventions that promote the prevention of negative outcomes and are in person

compared to interventions that promote good outcomes (Karatekin, 2018; Karatekin & Ahluwalia, 2021). The literature also demonstrates that resiliency and using adaptive resources (i.e., playfulness, future motivation, autonomy, adult support, and coping) can be late-emerging (Werner, 2013), reinforcing the importance of implementing interventions that promote well-being and successful transition into adulthood. As such, emerging adulthood represents a critical period for expressing resilience and instilling positive health behaviours that turn emerging adults' life course in a much healthier direction (Arnett, 2005).

A number of lessons can be drawn from previous and existing literature. First, interventions for this population should focus on providing in-person mental health and substance abuse services. Second, interventions should also persuade prevention-focused students with messaging that highlights the damaging effects of alcohol and presents help-seeking behaviour (e.g., social support, seeking professional help) as the best way to protect against them. Third, the research indicates that more than half of Canadian university drinkers (55%) report experiencing at least one negative alcohol-related consequence when they use alcohol (White & Hingson, 2013). University counsellors should assess for alcohol use among distressed students seeking help as it may highlight the potential for experiencing alcohol related problems. As such, post-secondary institutions across Canada should implement the Postsecondary Education Partnership aiming to reduce Alcohol Harms (PEP–AH; Canadian Centre on Substance Abuse [CCSA], 2016). The PEP-AH identifies the core elements of an effective campus alcohol policy to address high-risk drinking and provides 12 recommendations that align with the structure of the National Alcohol Strategy in five different strategic areas: (1) health promotion, prevention and education, (2) campus services, (3) availability and marketing, (4) pricing of alcohol, (5) community action. According to the evaluation of the National

Alcohol Strategy, post-secondary institutions should implement initiatives selected from each Strategic Area for Action rather than a select few recommendations (CCSA, 2016) to reduce high alcohol consumption and alcohol-related problems on campus. Finally, findings from the present study suggest that trauma-informed practices should be incorporated into existing post-secondary institutions' health care models. Colleges and universities should adopt the Substance Abuse and Mental Health Services Administration's "trauma-informed care" model, which provides information on incorporating key trauma principles into the organization's culture and trauma-specific interventions (i.e., assessment, treatment or recovery supports; Substance Abuse and Mental Health Services Administration, 2014). A history of trauma exposure is more common than not among individuals with alcohol and other drug use problems (Mills, 2015). Trauma-informed interventions recognize the impact of unresolved trauma, such as childhood adversity, on impeding the successful delivery of substance misuse interventions (Levenson & Grady, 2016; Murphy et al., 2016). By recognizing the role trauma has in the lives of the people seeking help, Canadian campuses can promote resiliency and healing from adversities experienced in childhood and teach adaptive coping strategies that assist students in managing their symptoms and maintaining a healthy lifestyle, including refraining from alcohol abuse. Other intervention techniques such as cognitive and behavioural strategies can help identify the perceived helpfulness of maladaptive coping strategies that reinforce harmful drinking behaviour and teach new coping strategies (Kadden, 1995; Longabaugh & Morgenstern, 1999). As such, institutions should make it easier for students to be aware of the resources available to them when they need them.

**Limitations and Future Directions**

Given the cross-sectional nature of the data and lack of any experimental manipulation, causality cannot be inferred for the present study. However, by definition, childhood adversity preceded the proximal life events and the experience of alcohol use and related problems in the past 30 days. The measures of alcohol consumption were not measured in real time; therefore, it is unclear whether drinking changed in response to perceived stress. While alcohol consumption could precede the occurrence of a stressful experience, previous research indicates that stress is a likely precursor to alcohol use (Brady & Sonne, 1999; Fox et al., 2007; Johnson & Pandina, 1993), although the same may not be accurate for alcohol related problems. Future research should consider the use of longitudinal designs to examine the consistency of the present study results and further examine the relations among study outcomes over time. For example, in a short-term longitudinal study by Karatekin (2016), they found that childhood adversity predicted worsening of mental health over the course of a semester and was mediated by current number of stressors among college students. There could be similar relationships occurring among Canadian post-secondary students with a history of childhood adversity and alcohol outcomes.

The present study also relied exclusively on self-report data, which limits the conclusions that can be drawn from this research. The use of more objective and clinically validated measures of stress and alcohol use (e.g., ecological momentary assessment; Collins et al., 1985; Murray et al., 2022; Serre et al., 2012; Yang et al., 2019) is needed to establish the relationships among childhood adversity, perceived stress, disengagement coping strategies, and alcohol outcomes. Childhood data was collected retrospectively and, therefore, subject to recall bias. However, comparisons of prospective and retrospective data show no bias in assessment and no differences among associations between number of childhood adversities reported and outcomes as a function of time of reporting(Hardt et al., 2010; Scott et al., 2010). The relatively young age

of the participants (average age = 20.0 years) should also have helped minimize bias due to memory limitations. The study was limited by a homogenous (i.e., predominantly White and female) sample recruited from one small to medium university in Northwestern Ontario. Therefore, it is unclear whether the findings will generalize to large and diverse emerging adult populations.

Researchers may also want to consider including other measures for the variables studied in the present study results in future research. For example, latent variables have been used in the literature as a measure of stress and coping (e.g., Dunkley & Blankstein, 2000) that may be relevant to the context of the present study. The models that were tested in the present study did not explain all of the variance in the outcome variables. This suggests that there are other variables contributing to the study outcomes. Future research should consider more comprehensive models that include additional variables that may be contributing to adjustment in university students. It may be the case that an unmeasured variable (e.g., high negative affectivity) is associated with higher reports of disengagement coping strategies as well as alcohol related problems. Previous research has shown that internalizing and externalizing disorders may partially mediate the relationship between stressful life events, childhood adversity, and alcohol outcomes (J. H. Kim et al., 2014; Young-Wolff et al., 2012). If childhood adversity potentiates risk for the development of psychopathology prior to or following later life stress, stress sensitization results for alcohol related problems could be attributable to co-occurring psychopathological symptoms. Ruling out these alternative explanations will require additional designs and methods. For example, a longitudinal design utilizing ecological momentary sampling could help disentangle whether greater stress and disengagement coping strategies precede alcohol outcomes or if these poorer outcomes beget greater stress and

disengagement coping strategies. Furthermore, assessing and adjusting for psychiatric symptoms and symptoms could help clarify the relationship between childhood adversity and alcohol related problems in emerging adults.

These limitations notwithstanding, the present research provides initial evidence for the significance of the stress sensitization hypothesis in accounting for ARPs among emerging adults with a history of childhood adversity and sets the stage for additional experimental and longitudinal studies to test these relationships further.

**Conclusion**

In the present study, childhood adversity is highly prevalent among the emerging adult university population. Childhood adversity is a potentially preventable exposure. Early identification of childhood adversity may help prevent the development of stress sensitivity, disengagement coping strategies, and other adverse outcomes such as alcohol related outcomes (Hyman et al., 2007). The findings from this study indicate that perceived stress and disengagement coping strategies mediate the relationship between childhood adversity and alcohol related problems. University programs that teach stress management and adaptive coping strategies among vulnerable students may ameliorate problematic alcohol outcomes and enhance the well-being of emerging adults. Additional research is still needed to expand on the present study findings and identify protective factors for emerging adults who are susceptible to alcohol related problems to preserve the well-being of university students.

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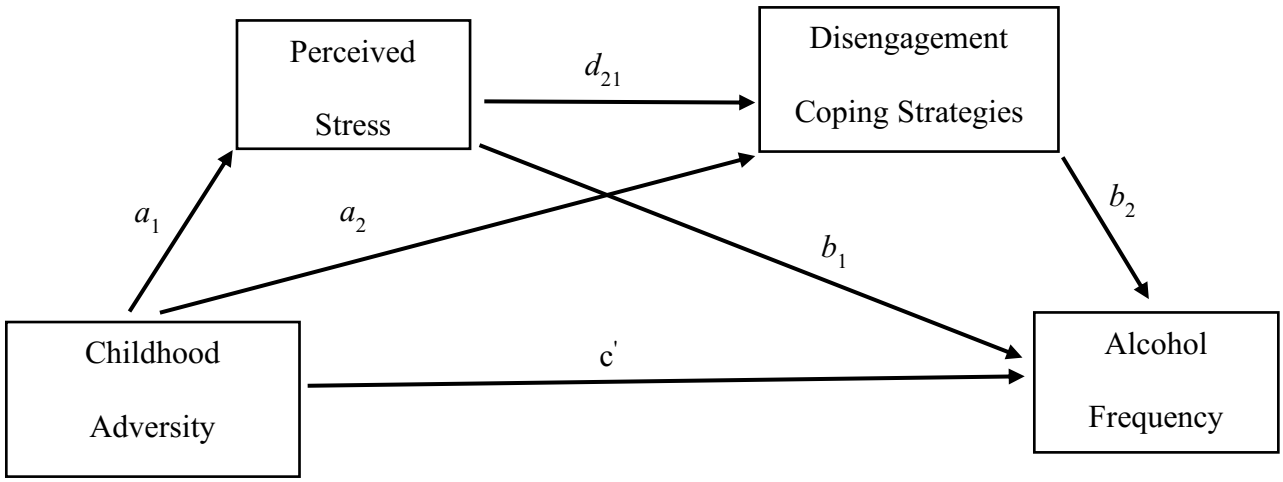
**Figure 1**

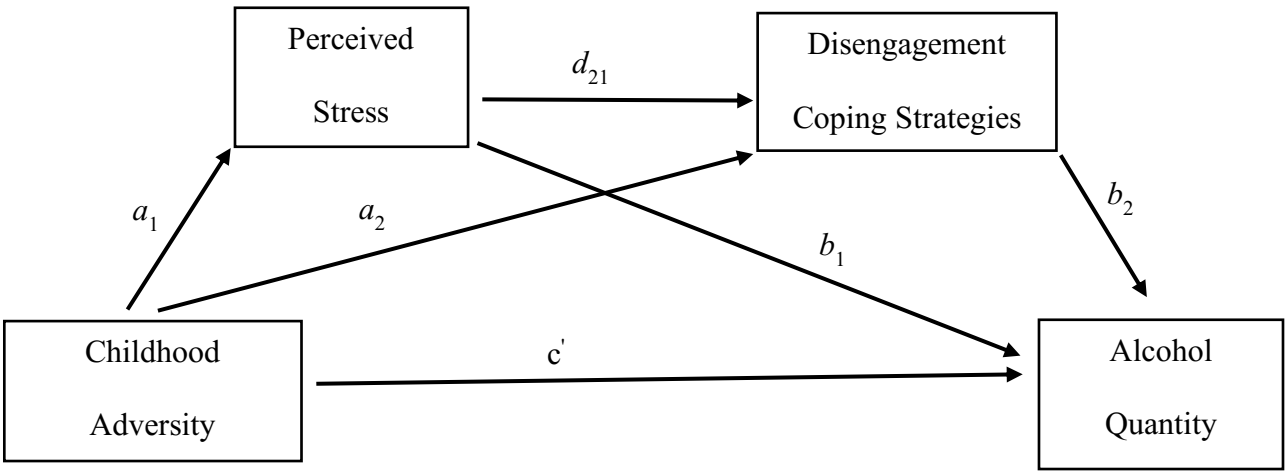
*Proposed Serial Mediation Model for Alcohol Frequency*




*Note*. Serial mediation illustrating the direct and indirect effects between childhood adversity and alcohol frequency among emerging adults. $a_1$, $a_2$, $b_1$, $b_2$, $d_{21}$, c' represent indirect effects. $a_1b_1$ and $a_2b_2$ represent specific indirect effects. $a_1d_{21}\ b_2$ represents the serial indirect effect.

**Figure 2**

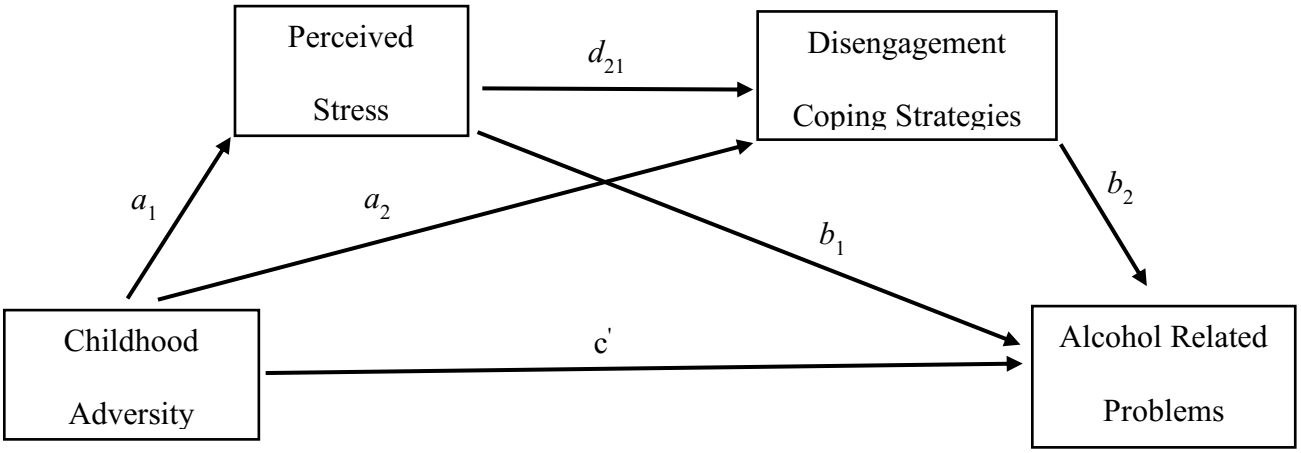
*Proposed Serial Mediation Model for Alcohol Quantity*




*Note*. Serial mediation illustrating the direct and indirect effects between childhood adversity and alcohol quantity among emerging adults. $a_1$, $a_2$, $b_1$, $b_2$, $d_{21}$, c' represent indirect effects. $a_1b_1$ and $a_2b_2$ represent specific indirect effects. $a_1d_{21}\ b_2$ represents the serial indirect effect.

**Figure 3**

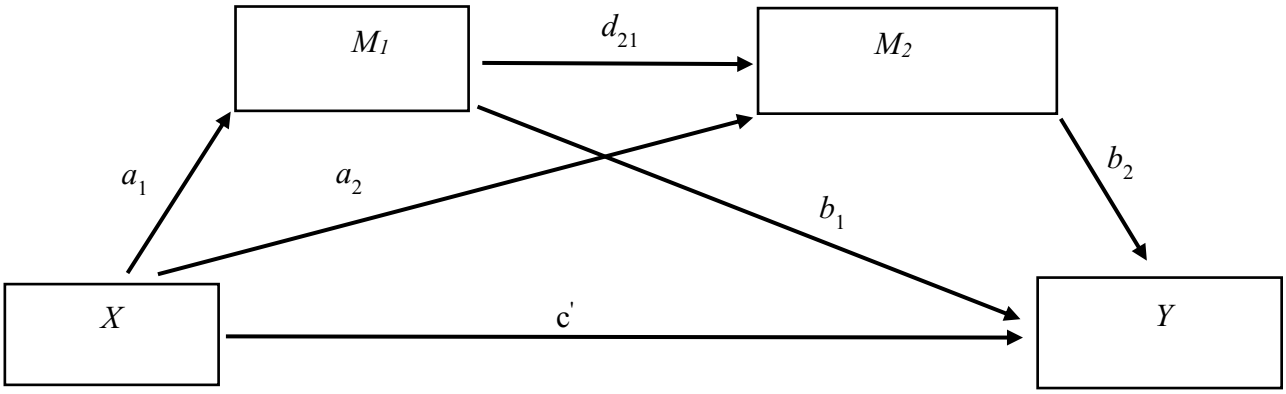
*Proposed Serial Mediation Model*




*Note*. Serial mediation illustrating the direct and indirect effects between childhood adversity and alcohol related problems among emerging adults. $a_1$, $a_2$, $b_1$, $b_2$, $d_{21}$, c' represent indirect effects. $a_1b_1$ and $a_2b_2$ represent specific indirect effects. $a_1d_{21}\ b_2$ represents the serial indirect effect.

**Figure 4**

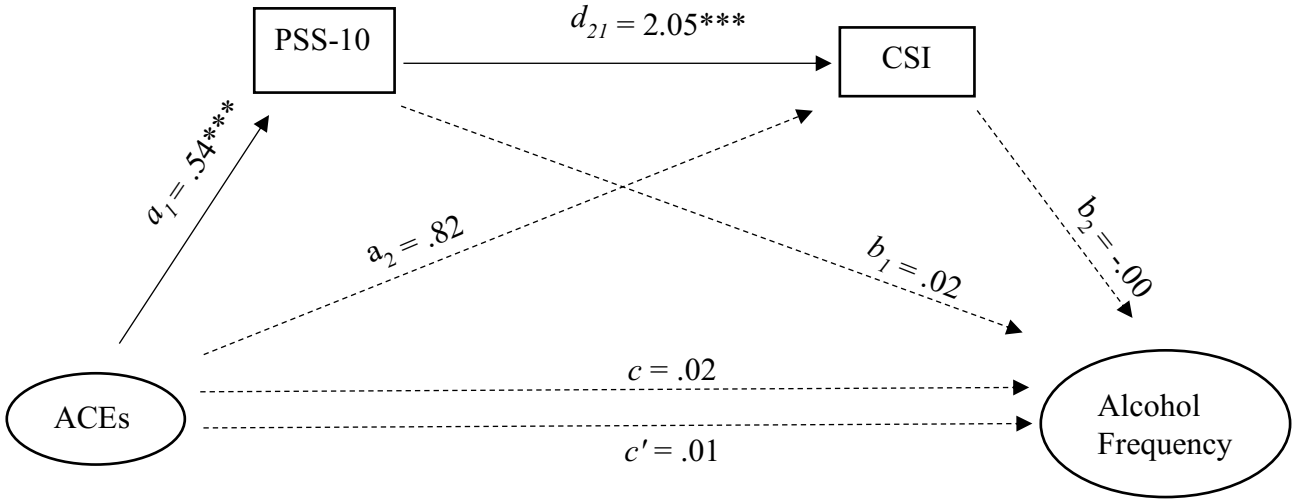
*Serial Mediation Model Diagram*




*Note*. Conceptual diagram of serial mediation model with two mediators. *X* represents the predictor variable. *Y* represents the outcome variable. *M1* and *M2* represent the mediators. $a_1$, $a_2$, $b_1$, $b_2$, $d_{21}$, c' represent indirect effects. $a_1b_1$ and $a_2b_2$ represent specific indirect effects. $a_1d_{21}\ b_2$ represents the serial indirect effect.

**Figure 5**

*Mediation Pathway: Assessing the Mediating Effect of Perceived Stress and Disengagement Coping Strategies on the Relationship Between Adverse Childhood Experiences and Alcohol Frequency*

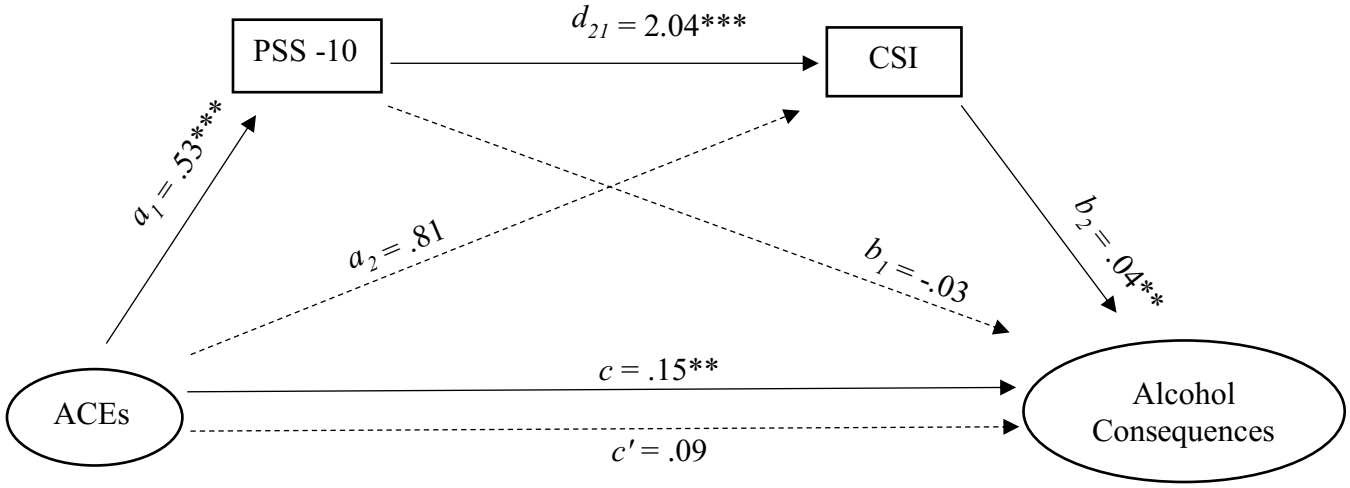



*Note.* Serial mediation illustrating the direct and indirect effects between childhood adversity and alcohol frequency among emerging adults. Unstandardized regression coefficients and standard errors (in parentheses) are provided. Rectangles within the figure represent mediators. $a_1$, $a_2$, $b_1$, $b_2$, $d_{21}$, and $c'$ represent direct effects. $a_1b_1$ and $a_2b_2$ represent specific indirect effects. $a_1d_{21}b_2$ represents the serial indirect effect. Significant effects are represented with solid lines and non-significant effects are represented with dotted lines.

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

**Figure 6**

*Mediation Pathway: Assessing the Mediating Effect of Perceived Stress and Disengagement Coping Strategies on the Relationship Between Adverse Childhood Experiences and Alcohol Consequences*




*Note*. Serial mediation illustrating the direct and indirect effects between childhood adversity and alcohol consequences among emerging adults. Ovals in the figure represent independent and dependent variables. Unstandardized regression coefficients and standard errors (in parentheses) are provided. Rectangles within the figure represent mediators. $a_1$, $a_2$, $b_1$, $b_2$, $d_{21}$, and *c'* represent direct effects. $a_1b_1$ and $a_2b_2$ represent specific indirect effects. $a_1d_{21}b_2$ represents the serial indirect effect. Significant effects are represented with solid lines and non-significant effects are represented with dotted lines.

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

**Appendix A – Study Poster**

# PARTICIPATE IN AN **ONLINE** STUDY!

## ADVERSE CHILDHOOD EXPERIENCES AND ALCOHOL USE

You are invited to participate in a research study on adverse childhood experiences, stress and coping, and alcohol use in **university students**.

### 1 Eligibility Criteria:

- Consumed alcohol in the **past 30 days**
- Between the **ages of 18-29**
- Speak/read fluently in English
- Have not previously participated in the study
- Access to Internet

### 2 Participation will involve:

- Attending a brief online zoom session to receive instructions
- Completing surveys online*

### 3 For participating, you will:

- Receive **1. 5 bonus points** towards an eligible psychology course

**To sign up, please visit the Lakehead SONA website or contact the research team at LU.coping.research.alc@gmail.com**

Principal Investigator:
Dr. Aislin Mushquash
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coping research lab

Lakehead University

*Some questions ask about difficult, personal experiences and may be hard for some people to think about (e.g., childhood abuse/neglect). Participants are free to skip questions they do not feel comfortable answering. If participants feel upset during the study, we have information available on relevant supports.

# Appendix B – Information Letter

**Childhood Adversity and Alcohol Use in Emerging Adults: Investigating the Role of Stress and Coping**

Dear Potential Participant:

You are invited to participate in our research study titled: **Childhood Adversity and Alcohol Use in Emerging Adults: Investigating the Role of Stress and Coping**. Your participation in this study is entirely voluntary, and whether you choose to participate or not will not impact your academic standing at Lakehead University. Before you decide whether or not you would like to take part, please read this letter carefully to understand what is involved. After you have read the letter, please ask any questions you may have.

**PURPOSE**

The purpose of this research is to examine the relationships between childhood adversity, perceived stress, coping strategies, and alcohol outcomes among emerging adults. Experiencing adversity in childhood is known to have lasting impact on stress reactions and coping strategies across the lifespan. Emerging adulthood is characterized by events (i.e., beginning post-secondary studies) that are associated with high levels of stress. An individual may use different coping strategies to attenuate experiences of stress that heightens their risk for alcohol use and related problems. This project will explore the impact of these early adverse experiences on alcohol outcomes in post-secondary students.

The Principal Investigator of the research is Dr. Aislin Mushquash, Assistant Professor, Department of Psychology, Lakehead University. Vamika Mann is a graduate student researcher in the Department of Psychology, Lakehead University, supervised by Dr. A. Mushquash. Jaidyn Charlton is a Research Assistant under the supervision of Dr. Mushquash.

**WHAT IS REQUESTED OF ME AS A PARTICIPANT? AND WHAT INFORMATION WILL BE COLLECTED?**

As a participant, you will be asked to: (a) attend an online (via Zoom) orientation session to receive more information about the study, and (b) complete a series of self-report surveys about your adverse childhood experiences, recent perceived stress and coping strategies, and alcohol use and related problems.

Some of the questions ask about potentially difficult, personal events that may have occurred in your life (e.g., childhood abuse/neglect). You are not required to answer all questions and can feel free to skip questions that you are not comfortable answering. Participating in the study should take up to 75-90 minutes.

**WHAT ARE MY RIGHTS AS A PARTICIPANT?**

As a participant, you are under no obligation to participate and are free to withdraw at any time without penalty. You have the right to withdraw your data from the study up until the data collection phase of the study is complete. Beyond this point, there will be no way to connect you to your data. Your decision to participate will not affect your academic status. You will be given, in a timely manner throughout the course of the research project, information that is relevant to your decision to continue or withdraw. To withdraw from the study, contact Dr. Mushquash at aislin.mushquash@lakeheadu.ca.

**WHAT ARE THE RISKS AND BENEFITS?**

There are no known harms associated with participating in the study. However, as mentioned above, some questionnaires will ask about difficult, personal experiences you may have had in your life (e.g., childhood abuse/neglect). Some of these questions may be hard for some people to think about or may cause some temporary distress. You are not required to answer all questions and can feel free to skip questions that you are

not comfortable answering. Should you feel upset during or after the study, we encourage you to contact any of the following support services:

| | | | |
|---|---|---|---|
| Lakehead University<br>Student Health and Counselling<br>(807) 343-8361 | Thunder Bay Counselling Centre<br>Walk-In Counselling<br>(807) 684-1880 | Good2Talk 24-hr<br>Student Helpline<br>1-866-925-5454 | Thunder Bay 24-hr<br>Crisis Response<br>(807) 346-8282 |

The information that you provide will not be shared with anyone outside of the research team. Your name will not be included on the surveys. All information will be stored on a password protected hard drive.

On the surveys, you may also endorse participating in some illegal activity (e.g., underage drinking). The information that you provide will not be shared with anyone outside of the research team. One exception is the unlikely event that our research records were subpoenaed by a Judge. To mitigate any potential risk of information pertaining to participants' illegal activity being accessed, your name will not be included on the questionnaires. Only a participant ID number will be included.

The primary benefits of the proposed study are for society and for the advancement of knowledge. Specifically, this study will provide information on the impact of adverse childhood experiences on alcohol outcomes in emerging adults and whether this relationship is mediated by stress and coping strategies.

For participating in the study via SONA, you will receive 1.5 bonus point to go towards an eligible psychology course.

**HOW WILL MY CONFIDENTIALITY BE MAINTAINED?**

Confidentiality will be maintained throughout the study. All participants will be provided a participant ID number at the beginning of their participation. All data obtained through the surveys will contain only this participant ID number. Please note that the online survey tools used in the study, Survey Monkey and Alcohol Timeline Follow Back, are hosted by a server located in the USA. The US Patriot Act permits US law enforcement officials, for the purpose of antiterrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this we cannot absolutely guarantee the full confidentiality of your data. With your consent to participate in this study, you acknowledge this.

**WHERE WILL MY DATA BE STORED?**

The surveys will be hosted through Survey Monkey and will only be accessed by research team members. The information systems and technical infrastructure for Survey Monkey are hosted within world-class, SOC 2 accredited data centers. Physical security controls at the data centers include 24x7 monitoring, cameras, visitor logs, entry requirements, and dedicated cages for Survey Monkey hardware. Survey Monkey encrypts data in transit using secure TLS cryptographic protocols. Any data stored in the Alcohol Timeline Follow Back is de-identified (contains only the participant ID) and stored on Brown University's secure server in the USA (https://www.smashlabs.org/timeline).

Data will be saved and stored on a password protected computer in the possession of either the Principal Investigator, student researcher, or research assistant. The electronic datafile containing data from the surveys will be stored on a password protected computer in the possession of either the Principal Investigator, student researcher, or research assistant. In accordance with Lakehead University's policy, data will be retained for at least 5 years following the completion of the research.

**HOW CAN I RECEIVE A COPY OF THE RESEARCH RESULTS?**

All findings will be presented in summary. If you would like to receive a summary of the findings following the completion of the study, follow the link at the end of the study and enter your email address. Your email address will not be associated with your study data. Individual results (e.g., scores on specific surveys) will not be made available to participants.

**RESEARCHER CONTACT INFORMATION:**

Dr. Aislin Mushquash, Ph.D., C.Psych.
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aislin.mushquash@lakeheadu.ca

Vamika Mann
Graduate Student Researcher
Department of Psychology
Lakehead University
mannv@lakeheadu.ca

**RESEARCH ETHICS BOARD REVIEW AND APPROVAL:**

This research study has been reviewed and approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at (807) 343-8283 or research@lakeheadu.ca.

## Appendix C – Orientation Reminder

**Subject**:
Childhood Adversity and Alcohol Use - Orientation Reminder

**Email Body**:

This is a reminder that you are scheduled to attend an orientation for the study titled: ***Childhood Adversity and Alcohol Use in Emerging Adults: Investigating the Role of Stress and Coping*** on _____ [date/time of session]. More information about the study is provided in the attached Information Letter. Please review this information prior to the orientation session.

Should you provide consent to participate, you will be asked to recall your alcohol use from the past 30 days through a method called an alcohol timeline follow back. To help you remember when and how much you drank over the past 30 days, it would be helpful to review and note down any personal events (e.g., birthdays, parties, appointment, paydays, academic events) in the past 30 days prior to attending the session. Sometimes people find it helpful to look back at their calendar, photos, or social media posts to recall how they spent their time over the past 30 days. We encourage you to do this prior to the orientation session so that you can most easily recall the required information.

**Zoom Instructions:**

You will be pre-registered in the Zoom meeting by a member of the research team using only your first initial. A separate email will be sent containing the Zoom link. Please use that email to access the orientation meeting on _____ [date/time of session].

**Participant ID:**

You will need to enter your Participant ID (below) when you access the surveys. The survey links will be provided during the orientation session. Your **Participant ID is [enter number].**

Please keep your Participant ID number in a safe place. If you ever lose your Participant ID number, please contact the research team at LU.coping.research.alc@gmail.com to receive a new Participant ID.

If you have any questions or concerns, please contact the research team at LU.coping.research.alc@gmail.com or the Principal Investigator at aislin.mushquash@lakeheadu.ca.

Thank you.

# Appendix D – Consent Form

**Childhood Adversity and Alcohol Use in Emerging Adults: Investigating the Role of Stress and Coping**
**MY CONSENT:**

I agree to the following:

- ✓ I have read and understand the information contained in the Information Letter
- ✓ I agree to participate
- ✓ I understand the risks and benefits to the study
- ✓ That I am a volunteer and can withdraw from the study up until the data collection phase is complete, and may choose not to answer any question
- ✓ That the data will be securely stored on a password protected hard drive for a minimum period of 5 years following completion of the research project
- ✓ I understand that the research findings will be made available to me upon request
- ✓ That my name will not be included on my questionnaire
- ✓ All of my questions have been answered and I can contact the Principal Investigator with further
- ✓ questions

By consenting to participate, I have not waived any rights to legal recourse in the event of research-related harm.

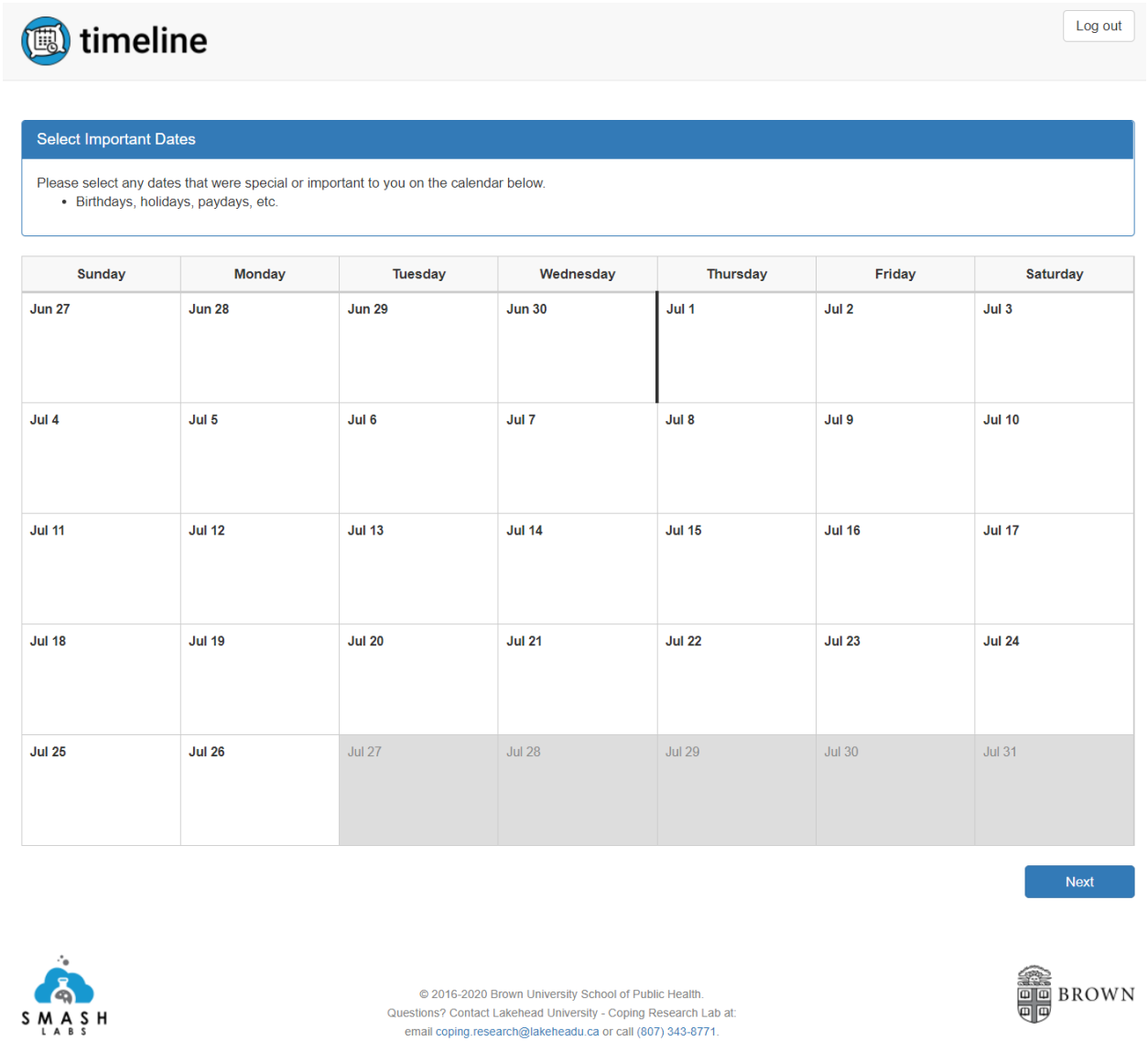
*Please note that the online survey tool used in the study, (SurveyMonkey and Timeline), is hosted by a server located in the USA. The US Patriot Act permits U.S. law enforcement officials, for the purpose of anti-terrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this we cannot absolutely guarantee the full confidentiality and anonymity of your data. With your consent to participate in this study, you acknowledge this.*

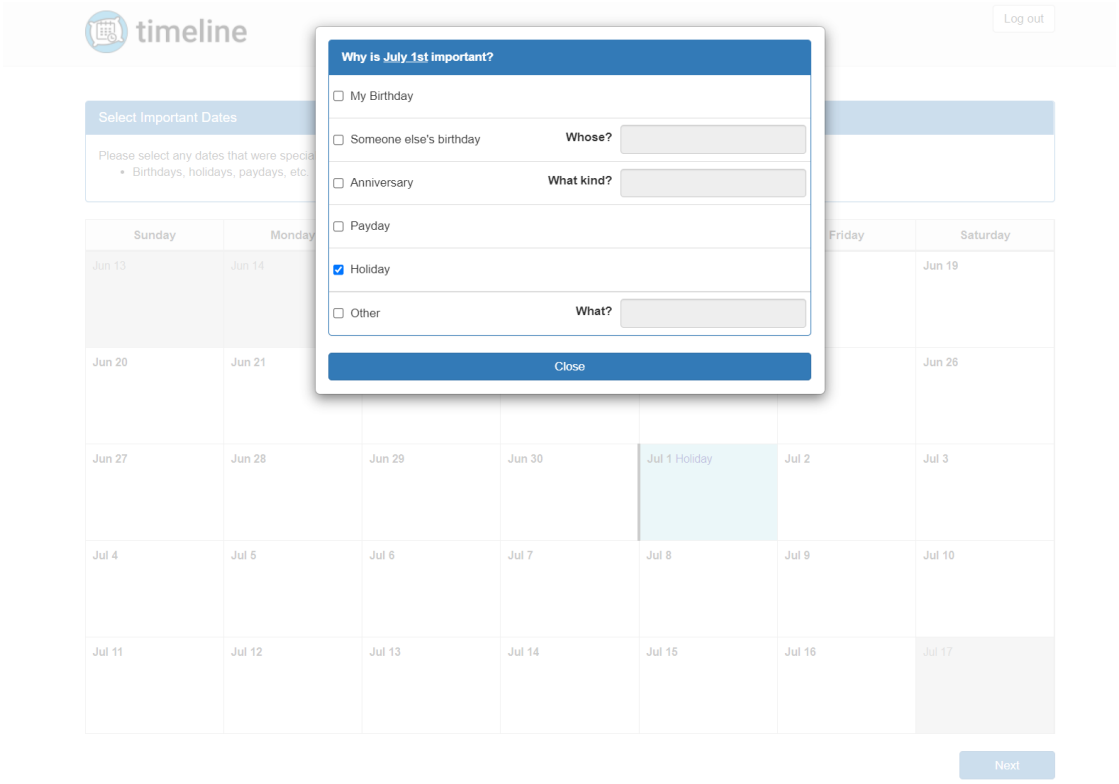
My consent has been given by clicking "CONSENT" below and continuing on to the survey.

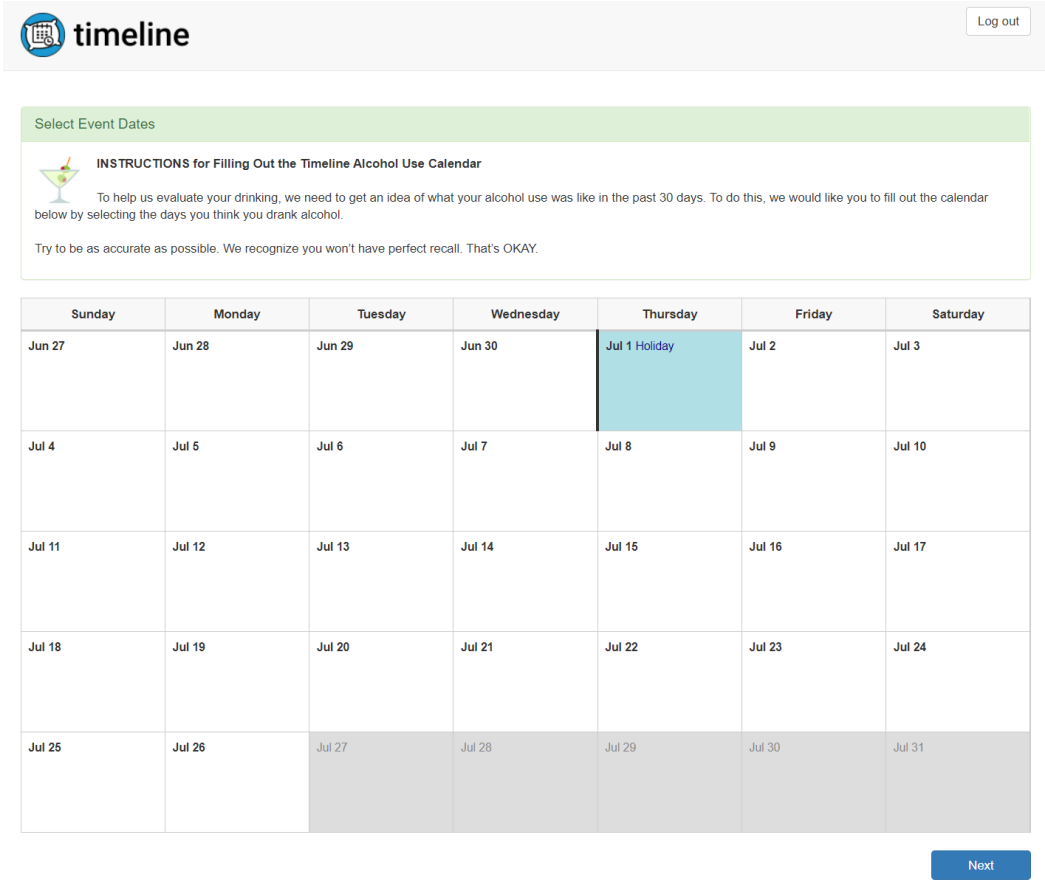
- ◯ I consent
- ◯ I do not consent

## Appendix E – Online Alcohol Timeline Follow Back

Alcohol Timeline Follow Back (Nova Southeastern University, 2021; Sobel & Sobel, 2003; Wray et al., 2019; https://tlfb.brown.edu/)




timeline
Log out
Why is July 1st important?
My Birthday
Someone else's birthday
Whose?
Anniversary
What kind?
Payday
Holiday
Other
What?
Close
Select Important Dates
Sunday
Monday
Friday
Saturday
Jun 13
Jun 14
Jun 19
Jun 20
Jun 21
Jun 26
Jun 27
Jun 28
Jun 29
Jun 30
Jul 1 Holiday
Jul 2
Jul 3
Jul 4
Jul 5
Jul 6
Jul 7
Jul 8
Jul 9
Jul 10
Jul 11
Jul 12
Jul 13
Jul 14
Jul 15
Jul 16
Jul 17
Next


timeline
Log out
Select Event Dates
INSTRUCTIONS for Filling Out the Timeline Alcohol Use Calendar
To help us evaluate your drinking, we need to get an idea of what your alcohol use was like in the past 30 days. To do this, we would like you to fill out the calendar below by selecting the days you think you drank alcohol.
Try to be as accurate as possible. We recognize you won't have perfect recall. That's OKAY.
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Jun 27
Jun 28
Jun 29
Jun 30
Jul 1 Holiday
Jul 2
Jul 3
Jul 4
Jul 5
Jul 6
Jul 7
Jul 8
Jul 9
Jul 10
Jul 11
Jul 12
Jul 13
Jul 14
Jul 15
Jul 16
Jul 17
Jul 18
Jul 19
Jul 20
Jul 21
Jul 22
Jul 23
Jul 24
Jul 25
Jul 26
Jul 27
Jul 28
Jul 29
Jul 30
Jul 31
Next

timeline

Log out

Select Event Dates

**INSTRUCTIONS for Filling Out the Timeline Alcohol Use Calendar**

To help us evaluate your drinking, we need to get an idea of what your alcohol use was like in the past 30 days. To do this, we would like you to fill out the calendar below by selecting the days you think you drank alcohol.

Try to be as accurate as possible. We recognize you won't have perfect recall. That's OKAY.

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| Jun 27 | Jun 28 | Jun 29 | Jun 30 | Jul 1 Holiday | Jul 2 | Jul 3 |
| Jul 4 | Jul 5 | Jul 6 | Jul 7 | Jul 8 | Jul 9 | Jul 10 |
| Jul 11 | Jul 12 | Jul 13 | Jul 14 | Jul 15 | Jul 16 | Jul 17 |
| Jul 18 | Jul 19 | Jul 20 | Jul 21 | Jul 22 | Jul 23 | Jul 24 |
| Jul 25 | Jul 26 | Jul 27 | Jul 28 | Jul 29 | Jul 30 | Jul 31 |

Next

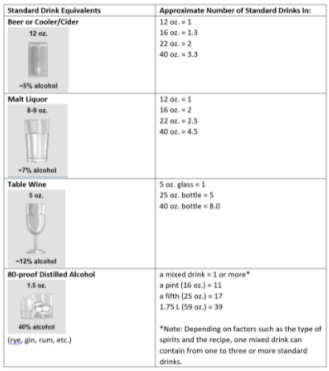
timeline

Log out

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 27 | 28 | 29 | 30 | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

Day 7 • July 3rd, 2021

1.) How many standard drinks did you consume this day? *(Please refer to the image and information below for reporting)*




**WHAT TO FILL IN**
Write in the total number of drinks you had.

We want you to record your drinking on the calendar using Standard Drinks. For example, if you had 6 beers, write the number 6 for that day. If you drank two or more different kinds of alcoholic beverages in a day such as 2 beers and 3 glasses of wine, you would write drinks for that day.

We realize it isn't easy to recall things with 100% accuracy.

If you are not sure whether you drank 7 or 11 drinks or whether you drank on a Thursday or a Friday, give it your best guess! What is important is that 7 or 11 drinks is very different from 1 or 2 drinks or 25 drinks. The goal is to get a sense of how frequently you drank, how much you drank, and your patterns of drinking.

**STANDARD DRINK**
A standard drink is any drink that contains about 13.6 grams of pure alcohol. Below are standard drink equivalents as well as the number of standard drinks in different container sizes for each beverage. These are approximate, as different brands and types of beverages vary in their actual alcohol content.

12 oz. of beer or cooler/cider is 1 drink (16 oz. = 1.3, 22 oz. = 2, 40 oz. = 3.3 drinks)

12 oz. of malt liquor is 1 drink is one drink (16 oz. = 2, 22 oz. = 2.5, 40 oz. = 4.5 drinks)

5 oz. of table wine is 1 drink (25 oz. bottle = 5, 40 oz. bottle = 8.0 drinks).

1.5 oz. (one shot) of 80 proof distilled alcohol is 1 or more *drinks** (a pint (16 oz.) = 11, a fifth (25 oz.) = 17, 1.75 L (59 oz.) = 39 drinks)

**Note: Depending on factors such as the type of spirits and the recipe, one mixed drink can contain from one to three or more standard drinks.*

Next

timeline

Log out

Great! Thank you!

- Your responses have been received and protected by your anonymous ID and password.
- If you have not yet completed each day, please return later to complete them.
- **Please remember your ID and password! To reset your password, you will need to contact us and prove your identity.**

Log out

## Appendix F – Adverse Childhood Experiences

Adverse Childhood Experiences (Felitti et al., 1998; Frewen et al., 2019)

While you were growing up, during your first 18 years of life…

| | Never | At least once | Many times |
|---|---|---|---|
| 1. Did a parent or other adult in the household often or very often… Swear at you, insult you, put you down, or humiliate you? OR Act in a way that made you afraid that you might be Physically hurt? | 0 | 1 | 2 |
| 2. Did a parent or other adult in the household often or very often… Push, grab, slap, or throw something at you? OR Ever hit you so hard that you had marks or were injured? | 0 | 1 | 2 |
| 3. Did an adult or person at least 5 years older than you ever… Touch or fondle you or have you touch their body in a sexual way? OR Attempt or actually have oral, anal, or vaginal intercourse with you? | 0 | 1 | 2 |
| 4. Did you often or very often feel that … No one in your family loved you or thought you were important or special? OR Your family didn't look out for each other, feel close to each other, or support each other? | 0 | 1 | 2 |
| 5. Did you often or very often feel that … You didn't have enough to eat, had to wear dirty clothes, and had no one protect you? OR Your parents were too drunk or high to take care of you or take you to the doctor if you needed it? | 0 | 1 | 2 |
| 6. Were your parents ever separated or divorced? | 0 | 1 | 2 |
| 7. Was your mother or stepmother: Often or very often pushed, grabbed, slapped, or had something thrown at her? OR Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? OR Ever repeatedly hit over at least a few minutes or threatened with a gun or knife? | 0 | 1 | 2 |

| | | | |
|---|---|---|---|
| 8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs? | 0 | 1 | 2 |
| 9. Was a household member depressed or mentally ill, or did a household member attempt suicide? | 0 | 1 | 2 |
| 10. Did a household member go to prison? | 0 | 1 | 2 |
| 11. Did a household member go to prison? | 0 | 1 | 2 |
| 12. Did peers, friends, or other children outside your household often or very often…<br>Bully you (in person or online), swear at you, insult you, put you down or humiliate you?<br>OR<br>Act in a way that made you afraid that you might be physically hurt? | 0 | 1 | 2 |
| 13. Did you often or very often experience being treated poorly because of your race, sexual orientation, place of birth, disability or religious values? | 0 | 1 | 2 |
| 14. Did an adult or caretaker at least 5 years older than you often or very often spank you for misbehaving, not following household rules or other reasons? | 0 | 1 | 2 |
| 15. Do you often or very often see or hear violence outside of the home in your neighbourhood or school neighbourhood? | 0 | 1 | 2 |
| 16. Did you often or very often feel that …<br>Someone in your household spent more money than they could afford to on gambling<br>OR<br>Ever gambled so often that bills were not able to be paid or household needs were strained? | 0 | 1 | 2 |
| 17. Were your parents ever placed in to foster care or alternative care? | 0 | 1 | 2 |

## Appendix G – Perceived Stress Scale

Perceived Stress Scale (Cohen et al., 1983)

The questions in this scale ask you about your feelings and thoughts ***during the last month (30 days).*** In each case, you will be asked to indicate by circling ***how often*** you felt or thought a certain way.

| | Never | Almost Never | Some-times | Fairly Often | Very Often |
|---|---|---|---|---|---|
| 1. *In the last month,* how often have you been upset because of something that happened unexpectedly? | 0 | 1 | 2 | 3 | 4 |
| 2. *In the last month*, how often have you felt that you were unable to control the important things in your life? | 0 | 1 | 2 | 3 | 4 |
| 3. *In the last month*, how often have you felt nervous and "stressed"? | 0 | 1 | 2 | 3 | 4 |
| 4. *In the last month*, how often have you felt confident about your ability to handle your personal problems? | 0 | 1 | 2 | 3 | 4 |
| 5. *In the last month*, how often have you felt that things were going your way? | 0 | 1 | 2 | 3 | 4 |
| 6. *In the last month,* how often have you found that you could not cope with all the things that you had to do? | 0 | 1 | 2 | 3 | 4 |
| 7. *In the last month*, how often have you been able to control irritations in your life? | 0 | 1 | 2 | 3 | 4 |
| 8. *In the last month,* how often have you felt that you were on top of things? | 0 | 1 | 2 | 3 | 4 |
| 9. *In the last month,* how often have you been angered because of things that were outside of your control? | 0 | 1 | 2 | 3 | 4 |
| 10. *In the last month,* how often have you felt difficulties were piling up so high that you could not overcome them? | 0 | 1 | 2 | 3 | 4 |

## Appendix H - Coping Strategies Inventory

Coping Strategies Inventory (Tobin et al., 1989)

Take a few minutes to think about a recent stressful event that occurred in the ***past month (30 days)****. As you read through the following items, please answer them based on how you handled your event.
Please read each item below and determine the extent to which you used it in handling your chosen event. Please do not mark on this inventory.

| | Not at all | A little | Somewhat | Much | Very much |
|---|---|---|---|---|---|
| 1. I slept more than usual. | 1 | 2 | 3 | 4 | 5 |
| 2. I hoped the problem would take care of itself. | 1 | 2 | 3 | 4 | 5 |
| 3. I told myself that if I wasn't so careless, things like this wouldn't happen. | 1 | 2 | 3 | 4 | 5 |
| 4. I tried to keep my feelings to myself. | 1 | 2 | 3 | 4 | 5 |
| 5. I went along as if nothing were happening. | 1 | 2 | 3 | 4 | 5 |
| 6. I hoped a miracle would happen. | 1 | 2 | 3 | 4 | 5 |
| 7. I realized that I brought the problem on myself. | 1 | 2 | 3 | 4 | 5 |
| 8. I spent more time alone. | 1 | 2 | 3 | 4 | 5 |
| 9. I tried to forget the whole thing. | 1 | 2 | 3 | 4 | 5 |
| 10. I wished that I never let myself get involved with that situation. | 1 | 2 | 3 | 4 | 5 |
| 11. I blamed myself. | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| 12. I avoided my family and friends. | 1 | 2 | 3 | 4 | 5 |
| 13. I didn't let it get to me; 1 refused to think about it too much. | 1 | 2 | 3 | 4 | 5 |
| 14. I wished that the situation would go away or somehow be over with. | 1 | 2 | 3 | 4 | 5 |
| 15. I criticized myself for what happened. | 1 | 2 | 3 | 4 | 5 |
| 16. I avoided being with people. | 1 | 2 | 3 | 4 | 5 |
| 17. I decided that it was really someone else's problem and not mine. | 1 | 2 | 3 | 4 | 5 |
| 18. I wished that the situation had never started. | 1 | 2 | 3 | 4 | 5 |
| 19. Since what happened was my fault, I really chewed myself out. . | 1 | 2 | 3 | 4 | 5 |
| 20. I didn't talk to other people about the problem. | 1 | 2 | 3 | 4 | 5 |
| 21. I avoided the person who was causing the trouble. | 1 | 2 | 3 | 4 | 5 |
| 22. I had fantasies or wishes about how things might turn out. | 1 | 2 | 3 | 4 | 5 |
| 23. I realized that I was personally responsible for my difficulties and really lectured myself. | 1 | 2 | 3 | 4 | 5 |
| 24. I spent some time by myself. | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| 25. I made light of the situation and refused to get too serious about it. | 1 | 2 | 3 | 4 | 5 |
| 26. I hoped that if I waited long enough, things would turn out OK. | 1 | 2 | 3 | 4 | 5 |
| 27. I kicked myself for letting this happen. | 1 | 2 | 3 | 4 | 5 |
| 28. I kept my thoughts and feelings to myself. | 1 | 2 | 3 | 4 | 5 |
| 29. Every time I thought about it I got upset; so I just stopped thinking about it. | 1 | 2 | 3 | 4 | 5 |
| 30. I wished I could have changed what happened. | 1 | 2 | 3 | 4 | 5 |
| 31. 1t was my mistake and I needed to suffer the consequences. | 1 | 2 | 3 | 4 | 5 |
| 32. I didn't let my family and friends know what was going on. | 1 | 2 | 3 | 4 | 5 |
| 33. I avoided thinking or doing anything about the situation. | 1 | 2 | 3 | 4 | 5 |
| 34. I thought about fantastic or unreal things that made me feel better. | 1 | 2 | 3 | 4 | 5 |
| 35. I told myself how stupid I was. | 1 | 2 | 3 | 4 | 5 |
| 36. I did not let others know how I was feeling. | 1 | 2 | 3 | 4 | 5 |

**Note*. Instructions have been modified from “during the past 3 months” to “during the past month (30 days)”.

## Appendix I – Standard Drink

Standard Drink Guideline (Butt et al., 2011; National Institute on Alcohol Abuse and Alcoholism, 2005)

A standard drink is any drink that contains about 13.6 grams of pure alcohol. Below are standard drink equivalents as well as the number of standard drinks in different container sizes for each beverage. These are approximate, as different brands and types of beverages vary in their actual alcohol content.

| **Standard Drink Equivalents** | **Approximate Number of Standard Drinks In:** |
|---|---|
| **Beer or Cooler/Cider**<br>12 oz.<br>  <br>~5% alcohol | 12 oz. = 1<br>16 oz. = 1.3<br>22 oz. = 2<br>40 oz. = 3.3 |
| **Malt Liquor**<br>8-9 oz.<br>  <br>~7% alcohol | 12 oz. = 1<br>16 oz. = 2<br>22 oz. = 2.5<br>40 oz. = 4.5 |
| **Table Wine**<br>5 oz.<br>  <br>~12% alcohol | 5 oz. glass = 1<br>25 oz. bottle = 5<br>40 oz. bottle = 8.0 |
| **80-proof Distilled Alcohol**<br>1.5 oz.<br>  <br>40% alcohol<br>(rye, gin, rum, etc.) | a mixed drink = 1 or more*<br>a pint (16 oz.) = 11<br>a fifth (25 oz.) = 17<br>1.75 L (59 oz.) = 39<br><br>*Note: Depending on factors such as the type of spirits and the recipe, one mixed drink can |

| | |
|---|---|
| | contain from one to three or more standard drinks. |

The percent of “pure” alcohol, expressed here as alcohol by volume (alc/vol), varies by beverage.

Although the "standard" drink amounts are helpful for following health guidelines, they may not reflect customary serving sizes. In addition, while the alcohol concentrations listed are "typical," there is considerable variability in alcohol content within each type of beverage (e.g., beer, wine, distilled spirits).

## Appendix J – Brief Young Adult Alcohol Consequences Questionnaire

Brief Young Adult Alcohol Consequences Questionnaire (Kahler et al., 2005; Read, 2009)

Below is a list of things that sometimes happen to people either during, or after they have been drinking alcohol. Next to each item below, please mark an "X" in either the YES or NO column to indicate whether that item describes something that has happened to you **IN THE PAST MONTH.**

| In the **past month…** | No | Yes |
|---|---|---|
| 1. **While drinking, I have said or done embarrassing things.** | 0 | 1 |
| 2. I have had a hangover (headache, sick stomach) the morning after I had been drinking. | 0 | 1 |
| 3. I have felt very sick to my stomach or thrown up after drinking. | 0 | 1 |
| 4. I often have ended up drinking on nights when I had planned not to drink. | 0 | 1 |
| 5. I have taken foolish risks when I have been drinking. | 0 | 1 |
| 6. I have passed out from drinking. | 0 | 1 |
| 7. I have found that I needed larger amounts of alcohol to feel any effect, or that I could no longer get high or drunk on the amount that used to get me high or drunk. | 0 | 1 |
| 8. When drinking, I have done impulsive things that I regretted later. | 0 | 1 |
| 9. I've not been able to remember large stretches of time while drinking heavily. | 0 | 1 |
| 10. I have driven a car when I knew I had too much to drink to drive safely. | 0 | 1 |
| 11. I have not gone to work or missed classes at school because of drinking, a hangover, or illness caused by drinking. | 0 | 1 |
| 12. My drinking has gotten me into sexual situations I later regretted. | 0 | 1 |
| 13. I have often found it difficult to limit how much I drink. | 0 | 1 |
| 14. I have become very rude, obnoxious or insulting after drinking. | 0 | 1 |
| 15. I have woken up in an unexpected place after heavy drinking. | 0 | 1 |
| 16. I have felt badly about myself because of my drinking. | 0 | 1 |
| 17. I have had less energy or felt tired because of my drinking. | 0 | 1 |
| 18. The quality of my work or schoolwork has suffered because of my drinking. | 0 | 1 |
| 19. I have spent too much time drinking. | 0 | 1 |
| 20. I have neglected my obligations to family, work, or school because of drinking. | 0 | 1 |
| 21. My drinking has created problems between myself and my boyfriend/girlfriend/spouse, parents, or other near relatives. | 0 | 1 |
| 22. I have been overweight because of drinking. | 0 | 1 |
| 23. My physical appearance has been harmed by my drinking. | 0 | 1 |

| | | |
|---|---|---|
| 24. I have felt like I needed a drink after I'd gotten up (that is, before breakfast). | 0 | 1 |