

The Influence of Stressors and Strain on Alcohol Use in Canadian Armed Forces Members

by

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### **Abstract**

Historically, alcohol consumption in the military has been widespread, especially post-deployment, which causes concern for the leadership of the Canadian Armed Forces (CAF) in the post-Afghanistan deployment era. In order to shed light onto this important issue, two studies assessed the impact of multiple stressors and strain on alcohol consumption utilizing a stressor-strain-alcohol consumption model (SSAC model).

Moreover, generational differences in alcohol consumption as well as various elements of the SSAC model were examined. In Study 1, an initial model identified the influence of pre-military service life stressors on alcohol consumption in recently enrolled members and found that increases in Negative Life Events and Exposure to Violence in their pre-service lives were associated with increases in alcohol consumption, and that these associations were mediated by posttraumatic stress disorder symptoms (PTSD).

Interestingly, Millennials were found to consume more alcohol than both Gen Xers and Late Baby Boomers, and they also demonstrated weaker associations between Childhood Neglect/Depression, Childhood Neglect/PTSD, and alcohol consumption/Negative Life Events than did Gen Xers. Equally noteworthy, Gen Xers and Late Baby Boomers consumed alcohol to the same degree. In Study 2, a revised model was tested in the post-deployment context with Combat Exposure as the stressor. Also, baseline information from pre-enrollment (Time 1) was controlled in the post-deployment SSAC model (Time 2) to further elucidate the impact of Combat Exposure on strain and alcohol consumption. Results indicated which stressors, namely Negative Life Events and Childhood Adversity, and strain (i.e., Depression and PTSD), had cumulative, long-term effects on members' alcohol consumption. Generations did not differ significantly on alcohol consumption, but it was noted that Millennials demonstrated weaker association between Time 1 and Time

2 alcohol consumption than did Gen Xers. This thesis bridges the gap in our understanding of alcohol consumption in a highly relevant and high-risk environment, thereby providing the CAF with insight into current alcohol consumption trends and precursors to alcohol consumption across generations.

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### Dedication

I dedicate this thesis to two very important groups of people who have shaped me into the woman I am today.

I dedicate this thesis to my parents, Larry and Anne, and my sisters Michele and Deb, for their unwavering support and understanding over the years that brought me this achievement. While they might have not always understood my pursuit of higher education, they consistently gave me the support and confidence to continue. My mother instilled in me the belief that I could do anything and be anyone that I wanted—because of her, I pursued and achieved many dreams. My father provided me with a strong sense of Canadian and military pride and values—because of him, I have and stood up for what I believe to be right, occasionally tilting a windmill, or two, and enjoyed an amazing military career. My sister Michele provided me with unconditional love, bolstered my confidence, and believed in me without reservation—because of her, I persisted when I doubted myself, enjoyed every victory, no matter how small, and finished this thesis with my sanity and sense of humor intact. She will likely never fully understand how important her support was.

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## **The Influence of Stressors and Strain on Alcohol Use in Canadian Armed Forces Members**

*“Malt does more than Milton can, to justify God’s ways to man”* A. E. Housman

In the post-Afghanistan operational era, alcohol consumption, dependence, and associated problems have garnered increased concern and attention in the Canadian Armed Forces (CAF) because of their positive associations with deployments and, specifically, with combat exposure (Bray et al, 2010; Brown, Williams, Bray, & Hourani, 2012; Browne et al., 2008; Clarke-Walper, Riviere, & Wilk, 2013; Hoge et al., 2004; Jacobson et al., 2008; Wagner & Jakupcak, 2012; Wilk et al., 2010). Moreover, the negative impact that alcohol-consumption behaviours can have on an individual’s physical and mental wellbeing are irrefutable and well established in both the general and military populations (Frone, 2013; Rehm et al., 2003; Rehm, Taylor, & Room, 2006; Standridge, Zylstra, & Adams, 2004; Taft et al., 2007). This misuse of alcohol is especially problematic in military populations, such as the CAF, where military members are exposed to high demands that extend well beyond conventional work stressors (e.g., combat, physical dangers, extended absences from home) and exhibit higher rates of alcohol consumption (Park, 2008). Furthermore, the characteristics of the CAF population—young and male-dominated—renders it susceptible to alcohol-related problems, as research has consistently attributed higher alcohol consumption to both younger adults and males (e.g., Rehm, Taylor, et al., 2006).

*Military culture* has been described as an additional risk factor for alcohol consumption, with military members routinely engaging in binge drinking traditions, ritualized drinking, and excessive alcohol consumption that are often considered as rites

of passage and extolled as badges of honour (Ames & Cunradi, 2004; Browne et al., 2008; Jones & Fear, 2011; Poehlman et al., 2011). While military members engage in these negative and potentially dangerous behaviours, military leaders have been working hard to curb these behaviours by employing strategies such as psychoeducation (e.g., deglamorizing alcohol abuse), health promotion (e.g., extolling the dangers of alcohol abuse), and policy enforcement (Bernier, 2014; Bray, Brown, & Williams, 2013; Wallace, Wallace, & Weeks, 2008). However, the increased level of alcohol consumption post-deployment has also garnered a lot of attention (Jacobson et al., 2008).

Over the span of almost a decade (2003 to 2012), the CAF deployed over 40,000 members to Afghanistan. Appropriately, there is a high degree of interest in examining the impact of these operational tours on the large number of Canadian military members who were deployed (e.g., Boulos & Zamorski, 2013). Although this interest has focused on mental health disorders to a large extent, and on alcohol consumption to a lesser degree, it is important to examine the two maladaptive outcomes together as they are often interrelated (e.g., Lee, Sudom, & Zamorski, 2013a; Wilk et al., 2010). Previous research focusing on post-deployment periods has found (a) increased levels of alcohol consumption, misuse, dependency, and alcohol-related problems in comparison to pre-deployment periods; (b) higher levels of alcohol consumption in members who deployed in comparison to non-deployed members; and (c) positive associations between alcohol consumption and combat exposure, poor physical health, and mental health disorders (Bliese, Edwards, & Sonnentag, 2017; Burnett-Zeigler et al., 2011; Dolan, Adler, Thomas, & Castro, 2005; Fear et al., 2010; Hawkins, Lapham, Kivlahan, & Bradley, 2010; Jacobson et al., 2008; Milliken, Auchterlonie, & Hoge, 2007). Furthermore,

between 1983 and 2007, alcohol use was linked to more than twice the number of deaths ( $n = 186$ ; 11% of all deaths) than combat ( $n = 70$  deaths; 5% of all deaths) within the CAF—a statistic that is even more compelling as it includes deaths attributed to Afghanistan missions (Tien, Acharya, & Redelemeir, 2010).

Efforts to understand the direct effects of alcohol consumption on health outcomes, in addition to its direct and indirect effects on social outcomes, are hampered by the complex and multi-dimensional factors associated with alcohol consumption (Li, Hewitt, & Grant, 2007). While precursors of alcohol consumption have been identified (i.e., stressors such as negative life events, work), the associations are not straightforward and have been shown to be hampered by previous reactions to strain (i.e., depression, post-traumatic stress disorder [PTSD]; Pflanz, 2006; Wagner & Jakupack, 2012). The tension-reduction model (Conger, 1956) posits individuals consume alcohol to reduce negative emotions (e.g., anxiety, tension, depression) caused by stressors (Colder, Chassin, Lee, & Villalta, 2010; Hopf, Sparta, & Bonci, 2011; Jacobson et al., 2008). In addition, to better explain the behavioural outcomes of stressors (e.g., alcohol consumption), the stress literature emphasizes the need for tailored, context-specific stressor models to examine the factors (e.g., strain; Frone, 1999; Hagihara, Miller, Tarumi, & Nobutomo, 2003; Pearlin, Menaghan, Lieberman, & Mullan, 1981). Taken together, these models form the basis of the primary objective of the present thesis, which was to develop a stressor-strain-alcohol consumption model to understand the factors that influence alcohol consumption. Understanding how previous life stressors, such as multiple negative life events, exposure to violence, or childhood experiences (e.g., abuse and neglect), can influence alcohol consumption both in and of themselves, and in

combination with combat-related strain is especially of interest in the post-Afghanistan era.

Of the many factors known to predict alcohol consumption, age has been widely accepted as being negatively related with alcohol consumption—as we age, we tend to drink less. Yet, early research on generational differences has indicated that alcohol consumption is not merely a function of age. That is, life experiences related to when one was born, or in what generation one was born into, may contribute to alcohol consumption, even when age is controlled for (e.g., Moore et al., 2005). Thus, the relation between alcohol consumption and age may be more complex than initially believed (Levenson, Aldwin, & Spiro, 1998). Accordingly, with rising concerns about differences in values, attitudes, and the actions of the younger generations (e.g., Millennials) who are slowly replacing what was once the largest and most influential generation—Baby Boomers (i.e., those born after World War II)—a secondary objective of this thesis was to explore generational differences in alcohol consumption.

Toward these ends, a diverse body of literature is reviewed in the following sections to understand alcohol consumption, starting with the negative impacts of alcohol consumption, drinking patterns, and alcohol consumption prevalence, especially in relation to alcohol-related demographics, such as sex,<sup>1</sup> age, and generation. Because of the impact that the work environment can have on alcohol consumption, research on alcohol consumption in the military environment is also discussed, with a particular emphasis on its prevalence and various risk factors. Lastly, in an effort to explain why

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<sup>1</sup> Although the study herein examines differences in stressor/strain/alcohol consumption use based on sex (physical characteristics of sex at birth), many other researchers examined differences in stressor/strain/alcohol consumption use based on gender (the gender one identifies with). When discussing other research, the appropriate term used by those researchers was applied.

people excessively consume and abuse alcohol, research related to stressors, strain, and stressor-strain models, as they relate to alcohol consumption, are presented.

### **Alcohol Use**

Due to the negative impacts of alcohol use on individuals (e.g., alcohol dependency and secondary health issues), organizations (e.g., the personal, economic, and social costs of working in stressful, unsafe, and unhealthy organizations; Kelloway & Day, 2005), and nations (e.g., health care system costs associated with alcohol consumption), the need to understand and reduce alcohol consumption has been recognized globally by the World Health Organization (Babor, Higgins-Biddle, Saunders, & Monterio, 2001; Rehm, 2011). Research on alcohol use has examined a wide range of alcohol-related behaviours and outcomes, each ranging in severity from mild to extreme. At one end of this spectrum, alcohol consumption reflects the extent that individuals consume alcohol (that is, whether individuals consume alcohol, at what frequency, and in what pattern). At the other end of the spectrum, alcohol use disorder represents a highly disabling, chronic relapsing brain disease that is characterized by compulsive alcohol use, loss of control over alcohol intake, and a negative emotional state in the absence of alcohol use (Diagnostic and Statistical Manual of Mental Disorders [DSM-V]; Grant et al., 2015). The eleven criteria for this diagnosis are behavioural (e.g., drinking more than intended, unable to stop drinking), physical (e.g., blackouts, withdrawal symptoms), and outcome related (e.g., drinking/being sick from drinking leading to an inability to care for family, causing troubles at work). The severity of alcohol use disorder varies from mild to severe based on the number of symptoms present, with the presence of two symptoms within a 12-month period being the minimum required to be diagnosed with alcohol use

disorder (DSM-V). As well, alcohol use disorder typically only afflicts a minority of individuals, as evidenced by its prevalence rates (e.g., a 12-month diagnosis was found in 14% of the US population, with 3.4% diagnosed with severe alcohol use disorder; Grant et al., 2015). Notwithstanding the importance of considering alcohol use disorder, there is value in focusing on alcohol consumption, as it generally affects a greater number of individuals within the population. Thus, alcohol consumption is the primary variable of interest the following sections.

### **Impact of Alcohol Use**

Not surprisingly, the focus of alcohol consumption research has been on its negative impacts. This is because the benefits of alcohol consumption are less prominent due to their rarity and dependence on low volumes and rates of alcohol consumption (e.g., one positive result is that small amounts of alcohol have been linked with reduced coronary heart disease; Corrao, Rubbiati, Bagnardi, Zambon, & Poikolainen, 2000; Grønbaek, 2009; Rehm et al., 2003; Rehm, Baliunas, et al., 2006; Standridge et al., 2004), and may be restricted to those over 55 years of age (Zhao, Stockwell, Roemer, Naimi, & Chikritzhs, 2017). Conversely, alcohol consumption has been linked to negative social and health consequences through three intermediate mechanisms: intoxication, dependence, and direct biological effects (Rehm et al., 2003). Intoxication may (a) have direct physiological effects (e.g., overdose, withdrawal; Cherpitel, 2007); (b) have indirect physiological effects, leading to intentional (e.g., suicide, self-inflicted injuries, violence, homicide, assault, child abuse) and unintentional injury (e.g., accidents, traffic injuries, excessive cold, fires, drowning; Rehm et al., 2003; 2006; 2011); and (c) lead to increased risky behaviours (e.g., unsafe sex, drug use, violence, reckless driving), which

could have high social consequences (e.g., arrest; Rehm, Taylor, et al., 2006). Persistent alcohol consumption can result in alcohol dependence which may, in turn, promote and reinforce increased drinking and, thereby, amplify negative health outcomes (Room, 2005). Direct biological effects are characterized by strong relations between alcohol consumption and major chronic diseases with both high mortality rates (e.g., cardiovascular diseases, digestive diseases, liver cirrhosis, hemorrhagic stroke, and various types of cancers) and low mortality, but significant morbidity rates (e.g., depression, diabetes, hypertensive disease, infectious diseases, PTSD; Rehm, et al., 2003; Rehm, Taylor, et al., 2006; Rehm, 2011; Taft et al., 2007). Often overlooked are the negative effects that alcohol consumption and alcohol-related problems have on other individuals. These deleterious effects range from mild (e.g., social harm to family, friends, or at the workplace; criminal convictions; financial problems) to devastating (e.g., assault, child abuse, domestic abuse, prenatal drinking, traffic accidents causing deaths and hospitalization; Rehm, 2011). If left untreated, alcohol problems cause concern because they can lead to both personal consequences (e.g., loss of health, damaging interpersonal relationships) and professional consequences (e.g., loss of credentials, being fired; Burnett-Zeigler et al., 2011).

Globally, alcohol abuse (i.e., the use of alcohol to the point where performance is diminished, and health is endangered; Frone, 2013) had been attributable to 5.9% of all mortalities (Rehm, Taylor, et al., 2006). Unfortunately, the World Health Organization's most recent report (2014) stated that "of all deaths worldwide, 5.9% are attributable to alcohol consumption" (pg. 49). Alcohol use has been recognized as a global burden of disease and injury because it has been identified as an important risk factor for over 200

conditions, which most recently has included the addition of infectious diseases (e.g., tuberculosis, HIV/AIDS, and pneumonia; World Health Organization, 2014). Within Canada, the economic cost of alcohol-related harm is \$14.6 billion annually, including \$7.1 billion attributed to lost productivity owing to illness and premature death, \$3.3 billion attributed to direct health care costs, and \$3.1 billion attributed to enforcement costs (Canadian Centre on Substance Abuse, 2015). These costs continue to rise in Canada as evidenced by a dramatic increase since 2002, when the estimate was only \$7.5 billion (Rehm, Baliunas, et al., 2006).

### **Drinking Patterns**

Alcohol consumption has been quantified using numerous methods to better to understand, diagnose, treat, and prevent alcohol abuse (Li et al., 2007). Although initial research focused on the volume of alcohol consumed, it has been widely accepted that frequency, volume of alcohol consumed, and drinking patterns are all equally important (Room, 2005). “In most cases, including alcohol dependence, the relation between daily amount of alcohol consumed (grams/day) is linear—the greater the quantity consumed the higher the relative risk” (Li et al., 2007, p. 58). As such, the amount of alcohol consumed is often studied in relation to the frequency of consumption and the duration of consumption at any given time. Simply put, the quantity (how much), the frequency (how often), and the pattern of consumption of alcohol (e.g., time of day, days within a week, duration during one period of consumption) are frequently measured and studied. For example, Canada’s Centre for Addiction and Mental Health’s (2015) Low-Risk Drinking Guidelines are based on frequency, volume, and drinking patterns, and recommend for women and men respectively, no more than 2-3 drinks a day most days, no more than 10-

15 drinks a week, the consumption of no more than 3-4 drinks on any single occasion, and to drink safely (e.g., no driving or using machinery while drinking).

**Consequences of alcohol consumption.** Researchers have also jointly considered drinking patterns (e.g., quantity of alcohol consumed) with the consequences of alcohol consumption. A drinking pattern such as binge drinking (i.e., usually, the consumption of where five or more drinks on any one occasion) on a weekly basis (frequency) has been identified as an “early quantifiable marker and risk factor for alcohol-use disorders” (Li et al., 2007, p. 61). Categorizing such patterns of alcohol consumption assists with identifying the impact of alcohol consumption (e.g., acute, chronic) and with alcohol-disorder diagnoses (e.g., DSM-V).

As alcohol has been described as the most commonly abused drug in the world (Puttler, Zucker, & Fitzgerald, 2018), it is not surprising that its abuse receives global attention. The World Health Organization considered both drinking patterns and alcohol-related problems to identify the level of risk associated with alcohol consumption in its development of the 10-item Alcohol Use Disorders Identification Test (AUDIT) to identify those who consume alcohol in dangerous amounts with negative consequences (Babor et al., 2001). Three drinking patterns have been identified based on the level of risk associated with alcohol use: (a) *hazardous (risky) drinking* is a pattern of alcohol consumption that increases the risk of harmful consequences for the user, and is associated with a high level of drinking problems; (b) *harmful drinking* is a pattern of alcohol consumption that results in consequences to physical and mental health; and (c) *alcohol dependence* is a cluster of behavioural, cognitive, and physiological phenomena (e.g., a strong desire to consume alcohol, impaired control over its use, persistent drinking

despite harmful consequences, a higher priority given to drinking than other activities) that develop after repeated alcohol use (Babor et al., 2001).

The AUDIT is used by practitioners to help identify individuals who would benefit from reducing alcohol consumption and includes suggestions for methods by which practitioners might treat individuals based on their AUDIT scores (e.g., the intervention of alcohol education is recommended for individuals with scores of seven or higher; Babor et al., 2001). The overall intent is to “reduce all types of alcohol-related harm,” especially before alcohol dependence occurs, as ceasing alcohol consumption at that point is more challenging and requires specialized treatments (Babor et al., 2001, p. 7). The AUDIT has been used extensively internationally and with other militaries (e.g., Cheng et al., 2012), and has been validated in over six countries, earning it a reputation as one of the best screening instruments for a range of alcohol-related problems (Fiellin, Carrington, & O’Connor, 2000). Within Canada, in the general population, 17% of Canadians reported engaging in hazardous drinking (males 16.5%, females 4%) and 24% reported one harmful event or more over the course of their life (males 19.3%, females 9.2%), but these levels are greater among Canadians between 19 and 24 years of age for both hazardous drinking (males 36.8%, females 24.5%) and reports of one or more harmful events (males 44%, females 35.7%; Adlaf, Begin, & Sawka, 2005; Thomas, 2012).

### **Prevalence of Alcohol Use**

Alcohol use across populations tends to change over time. In fact, many would advocate that alcohol consumption reflects cultural and societal norms (Phillips, 2014). Historically, within North America, certain points of time have been associated with

increases in alcohol consumption (e.g., post-WW I, post-prohibition, 60s, etc.) and decreases in alcohol consumption (e.g., the depression, prohibition; Meyers, Goldman, Hingson, Scotch, & Mangione, 1981; Phillips, 2014). Within Canada, a steady increase in alcohol consumption has been observed over the last decade according to Canadian Community Health Survey (CCHS) results (Thomas, 2012), with 80% of Canadian reporting drinking in the past year (Chief Public Health Officer, 2015). The average weekly consumption for Canadians over 15 years of age is approximately nine standard drinks (i.e., standard servings of beer, wine, or spirits; Thomas, 2012), which is below the Low-Risk Drinking Guidelines of no more than 10 drinks per week for women or 15 drinks per week for men (Canadian Centre on Substance Abuse, 2015). However, this fact is misleading, as 20% of the heaviest drinkers consumed 70% of the alcohol sold in Canada in 2004. The frequency of risky drinking, defined as having three or more drinks for a woman and four or more drinks for a man on one occasion (Canadian Centre on Substance Abuse, 2015), has increased, with 20% of women and 30% of men having reported risky alcohol consumption at least once a month or more (Thomas, 2012). Twenty-six percent of Canadians drank above the recommended levels at least occasionally (i.e., monthly if not more frequently; Thomas 2012), and approximately 24.4% of Canadians were binge drinkers (i.e., five or more drinks on one occasion, at least once a month; Canadian Centre on Substance Abuse, 2017). Various terms have been used to describe the pattern of drinking large volumes of alcohol (e.g., five drinks or more; some definitions vary) during a short time span (on one occasion), at least monthly: hazardous drinking, binge drinking, heavy drinking, risky drinking, and these are used interchangeably here.

Within the U.S., similar trends have been noted, with increases in alcohol consumption (by 20%), frequency of drinking (by 5% from 84 to 88 days/year), number of adults drinking (from 65% to 73%), and number of adults drinking heavily (from 22% to 26%; between 2001 and 2013; Dawson, Goldstein, Saha, & Grant, 2015). Several demographic characteristics have been found to be associated with alcohol consumption, such as “being White, being married, having a higher education level, having a higher income, and smoking” (Moore et al., 2015, p. 461). These *alcohol-related demographic characteristics* are known to predict alcohol consumption, and they include both sex and age. Furthermore, a third characteristic—generation—is proposed.

**Gender.** Gender differences in alcohol consumption and related problems have been widely recognized (Dawson et al., 2015; Rehm, Baliunas, et al., 2006; Thomas, 2012). For men, alcohol consumption peaks between the ages of 15 and 29, and then steadily declines, whereas, for women, it peaks and is consistent from 30 to 59 years of age, when it then sharply declines (Rehm, Taylor, et al., 2006). Although males consume more alcohol, on average, and engage in more risky drinking than do than females, rates for females are trending upwards faster for both behaviours compared to males in both Canada and the U.S. (Dawson et al., 2015; Thomas, 2012). Despite the narrowing of the gender gap in alcohol consumption and risky drinking over time, males within Canada are subject to 91% of alcohol-related deaths and 85% of reductions in life-spans attributed to alcohol consumption (Rehm, Taylor, et al., 2006).

**Age.** The negative relation between age and alcohol consumption has been well established, and it is commonly accepted that young adults report greater alcohol consumption than older age groups (e.g., Colder et al., 2010; Kuntsche, Knibbe, & Gmel,

2010; Thomas, 2012). Risky alcohol consumption in Canada peaks in young adulthood (18 to 24 years), with 50% of men and 45% of women (who drank in the past year) having consumed above the daily recommended amount at least monthly. These trends in risky drinking decline after age 25, but more quickly for females than for males (Thomas, 2012). Further, the proportion of young adults (those of 18 to 24 years of age) drinking in the U.S. has increased significantly from 70% to 78% (Dawson et al., 2015).

Although underage youth, young adults, and males represent segments of the Canadian population who commonly engage in risky alcohol consumption, anomalous increases have also been noticed in Canadians aged 24 to 34 years and 45 to 64 years (Thomas, 2012). In one U.S. study, the largest proportional increase in alcohol consumption was among individuals aged 65 and older (Dawson et al., 2015). In another study, alcohol consumption increased with age in a sample of relatively young Angolan soldiers ( $M = 29$  years,  $SD = 5.5$ ; Cheng et al., 2012). While the generalizability of this result to other military populations may be limited, a reverse-age trend is an important avenue to explore given that increased alcohol consumption with age would be problematic for combat readiness in any military. Although “young drinkers and males continue to have by far the higher volumes of consumption rates and rates of frequent heavy episodic drinking and thus remain critical targets of prevention efforts” (Dawson et al., 2015, p. 61), the drinking patterns based on age are not entirely straightforward and may be confounded by other factors, such as generation.

**Generation.** Generational information has proven to be useful in understanding differences in attitudes, tastes, and values due to shared experiences (Alsop, 2008; Kowske, Rasch, & Wiley, 2010; Murphy, 2011; Ng, Schweitzer, & Lyons, 2010;

Twenge, 2006). The seminal work of Mannheim (1952) proposed that shifts in attitudes and values between generations could explain aggregate-level changes within societies (Rudolph & Zacher, 2018). Two essential components of Mannheim's generational theory are that those within a generation share both "a common location in a historic time period and a *distinct consciousness* that is a result of important events of that time" (Joshi, Dencker, Fraz, & Martocchio, 2010, p. 397). Mannheim further advocated that generation be examined inclusive of age and period, such that the "joint influences of age *within* cohort *within* period" should be examined (Lyons, Urick, Kuron, & Schweitzer, 2015, p. 349). Age-based generational identity, which is based on Mannheim's principles in forming a social identity, purports that individuals raised during the same period develop similar attitudes, tastes, values, and behaviours because of the same social structure, attitudes, experiences, and cultural ambience which, combined, influence behaviours and attitudes later in life (Greenfield & Kerr, 2003; Joshi et al., 2010; Rudolph & Zacher, 2018). Rudolph and Zacher (2018) purport that Twenge's generational perspective reflects "the social-constructivist perspective. . . . as generations are socially constructed to explain the complexities of changing societies. . . . making a complex issue (i.e., aging) less complex" (p. 3). Extending on Kopperschmidt's (2000) definition that generation is "an identifiable group that shares birth years, age location, and significant life events at critical development stages" (p. 66), generation is defined herein as: a cohort of individuals born within specified years to reflect their collective experiences that shape and can likely predict future attitudes and behaviours (Joshi et al., 2010; Twenge, Campbell, Hoffman, & Lance, 2010). As extolled by Mannheim, variation within generations is expected, but generalized trends are expected for a given generation (Lyons

et al., 2015) because individuals share a generational persona (Pendergast, 2009).

Generation extends beyond age (as represented herein as one's chronological age), which is more related to life-stage than is generation, because a generation will span all life-stages over time.

Research on workplace generational differences (e.g., attitudes) has yielded few consistent results (e.g., meta-analysis by Costanza, Badger, Fraser, Severt, & Gade, 2012). This has been attributed to methodological limitations and inconsistencies (e.g., arbitrary age boundaries, cross-sectional designs, operational definitions of generations; Lyons & Kuron, 2014; Zabel, Biermeier-Hanson, Baltes, Early, & Shepard, 2017). More rigorous frameworks have been developed to address these shortfalls, such as Joshi and colleagues' (2010) three-generational-perspective framework applied to generational interactions, and Twenge et al.'s (2010) time-lag study. Although Rudolph and Zacher (2018) called for a moratorium on all generational workplace research and advocated for a life-span developmental perspective to avoid the challenges related to separating age, cohort, and life-stage effects, Lyons and Kuron (2014) make compelling arguments to continue exploring generational effects based on the extensive results that support generational differences, while considering these challenges.

Many different factors have been used to operationally define generation, such as social statistics (e.g., crime rates, divorce rates, youth suicide rates, education levels, unemployment, inflation) and birth years (although there is no consensus on which years or on what to name them; Cennamo & Gardner, 2008; Costanza et al., 2012; Foot, 1998). Based on a review of generational cohorts, five generations can be identified, with Baby Boomers being divided into two generations due to societal events that differ across the

large numbers of years normally attributable to this generation (e.g., 1946 to 1965; Debevec et al., 2013; Markus, 2014; refer to Appendix A for more details): Early Baby Boomers, Late Baby Boomers, Gen Xers, Millennials, and iGens.

Because substance abuse, including alcohol and/or illicit drugs, has been found to vary over periods (e.g., the 60s and 70s craze for drugs), generational differences in alcohol consumption should not be surprising. Indeed, a study by Grant (1997) was among the first to identify generational differences in drinking patterns, leading to the conclusion that within each generation, “the social structure, attitudes, and expectancies of each cohort make a difference in the extent to which members of that cohort engage in heavier drinking and experience more alcohol-related problems” (Blow, Barry, Welsh, & Booth, 2002b, p. 110). Generational differences have been noted in alcohol consumption (e.g., volume, frequency, and type of alcohol consumed) and attitudes towards alcohol during different periods in multi-decade longitudinal surveys (e.g., societal, cultural, or national, such as the prohibition in North America from 1910 to 1935; Greenfield & Kerr, 2003; Phillips, 2014). The “cultural ambience related to drinking during the formative years” also influences how and when people begin to drink in each generation (Greenfield & Kerr, 2003, p. 36). To garner a better understanding of these differences, it is important to consider the factors that influence alcohol-related attitudes and behaviours for each generation.

In addition to being known for the rapidly expanding population post-WWII, Early Baby Boomers (born 1946 to 1962; 19% of Canadians; Statistics Canada, 2015) are described as agents of change (e.g., civil rights, women’s movements, anti-war involvement) who lived during a time of economic expansion and optimism (Foot, 1998;

Marcus, 2014; Tapscott, 2009; Zemke, Raines, & Filipczak, 2013). This generation was raised in the era of the cocktail hour, the introduction of lounges, and post-prohibition when attitudes towards alcohol made it a daily feature in life. This translated into a generation consuming significantly more liquor (versus wine and beer) than younger generations (Kerr, Greenfield, Bond, Ye, & Rehm, 2004; Phillips, 2014). In the later 60s, during their formative years, Early Boomers' attitudes in general (e.g., towards social life, sex), and towards alcohol, became more liberal, as evidenced by the lowering of the minimum legal drinking age and increases in drug usage (e.g., marijuana, barbiturates, hallucinogens; Phillips, 2014).

These liberal attitudes would have shaped the attitudes of Late Baby Boomers, who were in direct competition with their older siblings for scarce resources and jobs (Foot, 1996). Late Baby Boomers (born 1953 to 1966; 8%<sup>2</sup> of Canadians; Statistics Canada, 2015) learned to *look out for number one* because they experienced economic hardships with the fall of the labour market and difficulty getting their careers on track (Foot, 1996, 1998). Perhaps because of these economic hardships, along with the negative perceptions of liquor relative to beer and wine (e.g., wine was touted as “a natural and healthy beverage”), this generation tended to consume significantly more beer, but less liquor, than Early Baby Boomers (Kerr et al., 2004; Phillips, 2014, p. 287).

The opportunities provided to Gen Xers (born 1967 to 1979; 20% of Canadians; Statistics Canada, 2015) allowed them to focus on social issues (e.g., peace, the environment, AIDS; Foot, 1998). This generation is characterized as being highly educated, media-centered, smart, skeptical, resourceful, and technologically adept

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<sup>2</sup> This estimate for Late Baby Boomers likely represents an underestimation, as it was not possible to capture the data for those born in 1960 and 1966 due to the age groups used by Statistics Canada, which consist of 4-year sections.

(Tapscott, 2009; Zemke et al., 2013). Although Kerr and colleagues (2013) found Gen Xers to be the highest drinkers in comparison to other generations, they attributed this to historically low alcohol prices, increased social acceptance of drinking, and a dramatic increase in alcohol advertising. From a historical perspective, Phillips (2014) noted that binge drinking had not become a serious and prolific problem for young people until the early 2000s (who would have been Gen Xers), which provides support for Kerr and colleagues' findings.

Although a large cohort that increased school enrolments, Millennials (born 1980 to 1995; 21% of Canadians; Statistics Canada, 2015) did not have to compete for resources as much as previous generations (Foot, 1998). This easy access to resources may have contributed to Millennials appearing, based on anecdotal evidence, to be markedly different from other generations in their entitled, self-centred, and hedonistic nature. Together, these notions caused a surge of interest in generational research, particularly with their arrival in the workplace (Alsop, 2008; Twenge, 2006; Twenge & Campbell, 2001). Although research indicates that Millennials engage in more high-risk behaviours, such as binge drinking, abuse of drugs (legal and illegal), sexual promiscuity, unprotected sex, and impaired driving, it has yet to be determined whether this is a function of their youth or their generation (Alsop, 2008; Keeling, 2003; Twenge, 2006).

As the youngest working generation, iGens (born 1996 to 2010; 17% of Canadians; Statistics Canada, 2015) are characterized by their technological savviness, apparent in their continual need to be connected to others electronically (e.g., internet, texts, social media via internet, computers, smart phones, etc.; Debevec, Schewe, Madden, & Diamond, 2013; Mitchell, 2010; Rosen, 2010; Tapscott, 2009; Note that not

all researchers would agree with the author to the label iGens for those born within these years, refer to Appendix A for more details). Although it is too early to definitively determine their drinking patterns, given that iGens are still under the legal drinking age, early data seems to tell conflicting stories. One report indicated that 74% of college-aged iGens (a third under 21) have consumed alcohol (with a preference towards beer instead of liquor; *Navigating the next generation of consumers*, 2017), but Bryant (2018) purported that this will be the sober generation, with 67% of iGens reporting that they avoid unhealthy behaviours, such as excessive drinking. Yet, national U.S. studies indicate that, of the iGens still in high school, many have consumed alcohol (63.2%), smoked marijuana (38.6%), and engaged in binge drinking (17.7%; Kann et al., 2016). This generation seems to condone marijuana and have a propensity to use drugs that have the same effects of alcohol. This may result in changes in alcohol consumption behaviours, especially in light of the recent legalization of marijuana in Canada (Gross, 2006; Phillips, 2014).

Despite the concerns of alcohol abuse in youth, it has often been found that older generations have the highest alcohol consumption rates (Phillips, 2014). Researchers speculate that the older generations drink more because they have the financial resources to do so and they were raised in more alcohol-permissive times, while, conversely, younger generations drink less owing to the greater popularity of drugs (Phillips, 2014). The US Census Bureau estimates that, by 2023, over 40% of alcohol drinkers will be 55 years of age and older (Bryant, 2018).

***Generational differences in alcohol consumption.*** Early research has illustrated that the negative association between alcohol consumption and age was more complex

and involved generational differences (e.g., Meyers et al., 1981), but much of the focus on generational differences in alcohol consumption has been centered on the behaviours of the older generations who make up a large part of the North American population. The size of this retiring generation has captured the attention of many researchers in terms of the pending impact on health care.

Despite the limitations of cross-sectional data, Meyers and colleagues (1981) illustrated some generational differences by collecting retrospective data on the drinking behaviours of participants' parents. Although they made excellent references to the generational events that might have influenced drinking attitudes (e.g., prohibition, the Great Depression), the cross-sectional design limited the ability to provide clearer support for generational differences in alcohol consumption, thereby emphasizing the need for longitudinal research.

Several longitudinal studies permitted the separation of the influence of age, cohort, and period in their analyses (Moore et al., 2005). In an early longitudinal study, Levenson and colleagues (1998) found that, although alcohol consumption declined over time on average, two cohorts showed non-linear patterns of stability, decline, and even an increase, in one case (i.e., drinking increased in one cohort from the age of 50 to the age of 60). In another longitudinal study, Baby Boomers (born between 1946 and 1964) were found to be more likely to continue to drink, remain in higher-drinking categories, and reduce their drinking at a rate slower than both older and younger generations (Blow, Barry, Welsh, & Booth, 2002a). The authors concluded that Baby Boomers may maintain a higher level of drinking than previous generations, which could seriously impact the provision of health care services to those with alcohol-related problems (Blow et al.,

2002a). One 20-year study, focused on individuals 55 years of age and older, found (a) an age effect, with individuals drinking less as time passed even after adjustments for cohort and period effects; (b) a period effect, with participants' alcohol consumption mirroring the U.S. per capita alcohol consumption during the period, as expected; and unexpectedly, (c) no cohort (birth year) effects on alcohol consumption, after controlling for alcohol-related demographic characteristics (e.g., age, sex) and period effects (i.e., U.S. per capita alcohol consumption for the year surveyed; Moore et al., 2005). But they did find, interestingly, that the rate of alcohol consumption decline (which increased with age) was slower in more recent birth cohorts than in older cohorts; in other words, "alcohol consumption levels in earlier cohorts declined at a faster rate with increased age" (Moore et al., 2005, p. 362). Put simply, 60-year-olds born in 1935 decreased their alcohol consumption at a slower rate than 60-year-olds who were born in 1925.

Similarly, the Department of Veterans Affairs Canada (VAC) has found that Baby Boomers are the largest users of substance abuse treatment services but, unlike older generations, Baby Boomers do not seem to be *aging out* (i.e., there is no decline in the need for treatment as they age; Booth & Blow, 2002). Notwithstanding the fact that alcohol consumption decreases with age, this decrease does not appear to occur at the same rate for all generations, providing evidence in support of the notion that there are generational differences in the decline of alcohol consumption.

While the generational research on alcohol consumption to date has focused primarily on older generations, evidence indicates a cause for concern over the drinking habits of Millennials, who engage in high rates of binge drinking and risky behaviours. When considered together, binge drinking and risky behaviours have been identified as

developmental factors of alcohol dependence (e.g., Keeling, 2003; Li et al., 2007; Twenge, 2006). Moreover, as Millennials replace older generations as the largest generation, there is a need to understand their alcohol consumption, abuse, and problems.

The confirmation of the serious impact of alcohol consumption on individuals and their families/friends, employers, and nations is more troubling when the high prevalence of alcohol use in North America and globally is considered. Cumulatively, research has refined our understanding of how to comprehensively measure alcohol consumption to include the quantity, frequency, patterns, and consequences of alcohol consumption. Further, the prediction of alcohol consumption is facilitated by knowing the alcohol-related demographics (e.g., sex, age, generation, education, race, socio-economic status). With this knowledge, the focus will now shift to discussing the military environment and its role in alcohol use, abuse, and problems.

### **Alcohol Use and Military Culture**

The societal views and attitudes towards alcohol consumption at work have changed over time from the use of alcohol at work as an enticement in preindustrial societies (e.g., to recruit, reward, and even pay workers) to its banishment from the workplace in the industrial revolution, when employers became responsible for at-work injuries (Ames & Janes, 1990; Frone, 2013). Nonetheless, although it is generally no longer acceptable in the workplace (Frone, 2006), alcohol consumption continues to have negative consequences for organizations (e.g., increased absenteeism, accidents, counterproductive behaviours, turnover, impaired performance, injuries; Cherpitel, 2007; Frone, 1999, 2004; Rehm, Taylor, et al., 2006).

Despite changes in societal norms regarding alcohol consumption, most militaries—including the CAF—have been slow to change policies and common practices involving alcohol consumption in the work environment in both on- and off-duty hours. Although alcohol consumption at work, during working hours, and on operational deployments has changed over the years within the CAF as a reflection of Canadian society, some of these changes have only occurred in recent years. In fact, drinking on operational deployments did not cease until the early 2000s, when the decision was made, for the first time, to have no alcohol available in Afghanistan. Also, alcohol consumption on board Royal Canadian Navy ships was permitted until 2014 (Pugliese, 2014). Nevertheless, drinking rates remain high, with an increase in hazardous drinking for CAF members, as reported in the AUDIT, from 13% to 20% between 2004 and 2014 (Born, Bogaert, Payne, & Wiens, 2010; Theriault, Gabler, & Naicker, 2016). Explanations for why the CAF was slower in changing alcohol consumption policies can be better understood when the military culture, in relation to alcohol consumption, is considered.

While organizations may have structural elements that permit individuals to drink heavily and not be detected (e.g., amount of supervision, job freedom, policies, schedule flexibility; Cooper, Russell, & Frone, 1990; Herold & Conlon, 1981), workplace culture can create expectations about the consequences—both positive and negative—of alcohol consumption (Grube, Ames, & Delaney, 1994). Organizations can have alcohol physically and/or socially available, support a permissive work culture (e.g., no policy, unstandardized policy application and leniency), and create drinking subcultures through work social relations (Ames & Cunradi, 2004; Ames, Duke, Moore, & Cunradi, 2009; Browne et al., 2008; Frone, 1999). In fact, drinking norms, peer-group behaviour, and

specifically work-group norms have been shown to influence alcohol consumption (Ames & Janes, 1990; Ames et al., 2009; Frone, 2013; Hays, Stacy, Widaman, DiMateo, & Downey, 1986; Herold & Conlon, 1981; Kuntsche, Knibbe, Gmel, & Engels, 2005; Seeman, Seeman, & Budros, 1988; Trice & Sonnenstuhl, 1990). This is corroborated by the binge drinking traditions found in some institutions and occupations (e.g., assembly workers, railroad workers; Trice & Sonnenstuhl, 1990), and is especially true in the military (Ames & Cunradi, 2004; Ames & Janes, 1990; Browne et al., 2008; Jones & Fear, 2011).

Studies have illustrated that the established drinking culture; ease of availability; permissive attitudes toward alcohol consumption before, during, and after work; ritualized drinking opportunities; expectations about binge drinking after work, while on vacation, or leave following a deployment (i.e., *shore leave*, which is vacation taken after a deployment); and inconsistent policy application have created risk factors for alcohol problems in the military today (Ames & Cunradi, 2004). Historically, being a heavy drinker and being a soldier were believed to go hand in hand. In the 1800s, the UK Armed Forces issued alcohol for a variety of reasons, including to bolster courage both before and during battles (e.g., a *spirit ration* or *Dutch courage*), to mediate stress during and after battle, and to provide a daily incentive (e.g., Royal Navy's *rum ration*; Jones & Fear, 2011). Alcohol-induced shore leave for Navy personnel in various militaries is common practice (Ames et al., 2009). Today, the culture in the U.S. Navy has members using ritualized alcohol consumption to improve bonding, to provide a form of recreation (e.g., during shore leave), and to relieve stress (Ames, Cunradi, Moore, & Stern, 2007), so much so that binge drinking (i.e., five or more drinks in two hours for men on one

occasion) is endorsed and expected by members, especially during shore leave (Ames et al., 2009). U.S. Marine Corps and Navy members are still reporting they drink to fit in, bond with others, and personify the *work-hard-play-hard* culture (Poehlman et al., 2011). These practices are enforced for several reasons, and one of these includes the view that alcohol use enhances comradeship among military colleagues (Browne et al., 2008).

Even though the hazards associated with alcohol use and abuse both in combat and in routine military life were recognized in as early as the 1970s, alcohol consumption has persisted (e.g., Gulf War by Australian soldiers, Vietnam by U.S. members; Ikin et al., 2004; Jones & Fear, 2011; Kuzmarov, 2006). For example, the practice of the U.S. military in permitting its soldiers to drink on military bases regardless of whether they met the minimum legal drinking age did not cease until 1988. Since then, U.S. military policies and programs have focused on alcohol deglamorization, instilling a sense of personal responsibility, and developing health promotion programs to reduce alcohol-related problems and increase healthy behaviours (Wallace et al., 2008). Despite these efforts, alcohol consumption and alcohol-related problems continue to rise (e.g., Bray et al., 2013). This persistence may, in part, be due to the military culture that has been identified as one of the many risk factors (e.g., time away, deployments), which will be discussed later.

### **Prevalence of Alcohol Use in the Military**

As mentioned, an increase in alcohol consumption has been noted in CAF members. As many as 48% of CAF members reported high-risk drinking in 2008/2009 (Whitehead & Hawes, 2010), up from 16% in 1989 (Whelan, 2001). Binge drinking is also engaged in by a large percentage of CAF members (65%; Theriault et al., 2016). The

prevalence of heavy alcohol consumption in U.S. military personnel has fluctuated over the past decades, starting at 24% in 1982, declining to 15% in 1992, and returning to 20% in 2008 (Bray, Kroutil, & Marsden, 1995; Bray et al., 2010). Binge drinking by active duty U.S. military personnel has also steadily increased from 35% (1998) to 47% (2008; Bray et al., 2009; Bray et al., 2010; Bray et al., 2013). In one study, binge drinking was reported by almost half of the U.S. active-duty military personnel surveyed (43%), of which the majority was under 25 years of age (67%; Stahre, Brewer, Fonseca, & Naimi, 2009), thereby confirming that younger military personnel are at greater risk of heavy alcohol abuse than older members (Bray et al., 2010). UK military personnel have also reported alcohol abuse at high levels (18%; Iversen et al., 2009).

**Alcohol consumption in military recruits.** Representing the youngest military group, recruits are military members who are within their first months of service and undergoing initial military training. The study of military recruits has garnered attention to establish baseline measures of pre-existing health conditions and behaviours (e.g., fitness, diet, alcohol consumption) and to determine the impact of members' initial health on their long-term health, especially post-deployment (Lee & Hachey, 2011; Smith et al., 2014). Included in this is the identification of pre-existing drinking patterns and problems of recruits, thus enabling the development and provision of better prevention programs (Ames et al., 2007).

Not surprisingly, results pertaining to alcohol consumption among CAF recruits have mirrored those found in the general Canadian population (a) with age being negatively related to alcohol consumption, especially with frequency of drinking and binge drinking; and (b) males drinking more often, drinking in larger quantities, and

engaging in more binge drinking than females (Lee & Hachey, 2011). Although trends in alcohol consumption in CAF recruits have fluctuated over the last decade, overall, binge drinking has increased (Lee & Hachey, 2011; Lee, Sumner, & Hachey, 2015). Still, these results do not address the question of whether military members drink more than their civilian counterparts or whether high levels of alcohol consumption are attributable to the predominantly young population of men in the military.

**Comparing alcohol consumption of military members to civilians.** Research has shown that military members drink more and, subsequently, have more alcohol-related drinking problems than do civilians (Ames, Cunradi, & Moore, 2002; Messer, Liu, Hoge, Cowan, & Engel, 2004). UK Armed Forces and U.S. military personnel have repeatedly surpassed their respective civilian populations in alcohol consumption, binge drinking, and hazardous drinking (as identified with a score of 8 or greater on the AUDIT; Browne et al., 2008; Fear et al., 2007; Henderson, Langston, & Greenberg, 2009). Furthermore, even when age and gender are controlled, some studies continue to find that U.S. military members reported higher levels of alcohol abuse/dependency than civilians (Bray et al., 2006; Messer et al., 2004; Poehlman et al., 2011).

While searching for a comparable population, other researchers have drawn parallels between young soldiers and college students. Both groups have normalized drinking regularly and to excess, trivialized the dangerous effects of alcohol, and perceived traditionally accepted excessive amounts of alcohol consumption as non-excessive (Russo, 2007). Taking this approach allowed Bray and colleagues to (2003) to discover that, while U.S. military members had significantly higher rates of binge drinking (42%) and heavy drinking (17%) when compared to civilians (17% and 12%,

respectively), after controlling for age and sex, both groups had similar binge drinking rates (45%; Bray et al., 2003). Similarly, in the CAF, though alcohol dependence had been found to be significantly higher in military members (5% of the population) than in civilians (3.3%), this difference disappeared once adjustments were made for age and gender (Park, 2008).

Notwithstanding these findings, the bulk of the research has shown that military members tend to consume higher and more dangerous levels of alcohol and have more alcohol-related problems than their civilian counterparts (Ames et al., 2002; Bray et al., 2003; Bray et al., 2006; Browne et al., 2008; Fear et al., 2007; Henderson et al., 2009; Liu et al., 2004; Messer et al., 2004; Poehlman et al., 2011). This body of evidence provides another compelling reason why alcohol consumption in the CAF needs to be better understood. The high prevalence of alcohol consumption has led many researchers to examine the risk factors associated with alcohol consumption in the military to better understand how to mitigate the associated problems.

### **Military Risk Factors for Alcohol Use**

In addition to sociodemographic variables typically known to predict alcohol consumption (e.g., age, sex, race/ethnicity, education, and marital status), several military-specific risk factors have been found for alcohol consumption.

**Absences from home.** Regardless of the military reasons to be away, the duration and frequency of time away from home have been positively associated with alcohol consumption, alcohol-related problems, and dependence (e.g., deployments, exercises, sea time, individual or collective training, temporary duty, aid to civil authorities, and Canadian disaster relief missions; Park, 2008). Specifically, for CAF members who were

away for 12 of the last 24 months, the likelihood of reporting alcohol dependency was almost twice that associated with being away for six months in the same period (Park, 2008). These results are echoed in U.S. studies in which deployment duration was found to be positively associated with alcohol consumption and, specifically, binge drinking among military personnel (Ames et al., 2007; Ramchand et al., 2011).

**Deployments.** Deployments in and of themselves tend to present their own challenges for members with respect to their personal lives (e.g., increased divorce and separation rates, adverse impacts on children and spouses; Blanc & Kelloway, 2014). These challenges are coupled with increased alcohol consumption, alcohol misuse, alcohol related-behavioural problems, and alcohol dependence (Bray et al, 2010; Brown et al., 2012; Browne et al., 2008; Clarke-Walper et al., 2013; Hoge et al., 2004; Jacobson et al., 2008; Wilk et al., 2010). Studies show that levels of alcohol consumption increase post-deployment, in comparison to pre-deployment (Jacobson et al., 2008; Wagner & Jakupcak, 2012). In the U.S. military, the prevalence of alcohol consumption post-deployment has been considerable for regularly serving men (23%) and women (6%; Hawkins et al., 2010), and members of the National Guard (36%; Burnett-Zeigler et al., 2011). For the UK Armed Forces, rates of binge drinking (47%; which had been defined as occurring on a weekly versus monthly basis—four times higher than a traditional definition of binge drinking), alcohol related-harm (23%), and alcohol dependence (6%) have been notably higher post-deployment, with the latter two behaviours also being associated with functional impairment (i.e., psychological/social impairment; Rona et al., 2010).

Military members who were deployed on operational tours have repeatedly reported significantly higher levels of alcohol use/abuse than their counterparts who were not deployed. This includes U.S. Iraq/Afghanistan veterans, U.S. Gulf War veterans, UK Armed Forces, U.S. National Guard/Reserves, Australian Gulf War veterans (even a decade after the war), and Norwegian United Nations military observers (in comparison to peacekeepers; Fear et al., 2010; Hawkins et al., 2010; Ikin et al., 2004; Mehlum, Koldslund, & Loeb, 2006; Milliken et al., 2007; The Iowa Persian Gulf Study Group, 1997). However, simply being deployed to a combat environment is not indicative of the whole story. Similar to other contexts, demographic characteristics associated with an increased risk for alcohol consumption post-deployment include being younger, unmarried, White, and living with mental-health problems (Burnett-Zeigler et al., 2011).

In addition to cross-sectional studies, longitudinal studies have confirmed an increase in alcohol consumption, in general, and binge drinking, specifically, over time after deployment (Hooper et al., 2008). These studies have confirmed that heavy drinkers (i.e., score of 16 or more on the AUDIT), reserve members, non-active duty military members, males, and those exposed to combat were at greater risk for increased levels of heavy weekly drinking, binge drinking, and alcohol-related behavioural problems (Blume, Schmaling, & Russell, 2010; Browne et al., 2008; Jacobson et al., 2008). By examining changes in drinking patterns, greater insight into changes in behaviour pre- and post-deployment has been gained. For example, proportionally, more women than men reported heavy weekly drinking pre-deployment (Time 1) and new-onset drinking post-deployment (Time 2), but they were less likely to report new-onset binge drinking post-

deployment (Time 2). In comparison, proportionally more men reported binge drinking and alcohol-related problems pre- and post-deployment (Jacobson et al., 2008).

**Number of deployments.** Counterintuitively, increases in the number of deployments has not always been associated with increases negative outcomes. Williams and colleagues (2015) found that there was a lower risk of relapse in problem drinking for members who had multiple deployments. They attributed this lack of finding to the *healthy warrior effect*, which purports that only psychologically and physically fit members are selected to return on deployments repeatedly, resulting in a smaller cohort of resilient soldiers who can withstand the effects of combat (e.g., healthier, high functioning individuals who exhibit low levels of alcohol-related problems; Haley, 1998; Hoge, 2008; Larson, Highfill-McRoy, & Booth-Kewley, 2008; Williams et al., 2015; Wilson et al., 2009).

**Poor mental health.** The comorbidity of problematic alcohol consumption with other psychological conditions is also a common finding (Burnett-Zeigler et al., 2011; Donovan, Padin-Rivera, & Kowaliw, 2001; Pietrzak, Goldstein, Southwick, & Grant, 2011; Steward, 1996). This finding is equally true with military populations, with PTSD demonstrating high comorbidity with alcohol-related problems (e.g., Brown et al., 2012; Fetzner, Abrams, & Asmundson, 2013). CAF members with PTSD and depression report higher levels of alcohol consumption (Skomorovsky & Lee, 2012), and similar results were found with veterans of the CAF (Fetzner et al., 2013), which aligns with research on U.S. military personnel (Ramchand et al., 2011).

**Branch.** Higher levels of alcohol consumption and alcohol-related problems have been positively associated with branches of service (e.g., Army, Air Force, Navy,

Marines). Within the U.S. military, the effects of military culture on drinking varies between its service branches with young, male members of the U.S. Marine Corps reporting significantly higher levels of binge drinking than the other services (Ames & Cunradi, 2004; Bray et al., 2003).

**Rank.** Levels of alcohol consumption have been negatively associated with rank because it is considered a proxy indicator of socio-economic status (SES; Adler, Huffman, Bliese, & Castro, 2005; Ames & Cunradi, 2004; Bray et al., 2003; Lee & Hachey, 2011). Lower-ranked military members tend to drink larger volumes of alcohol, engage in binge drinking more frequently, and suffer from more serious consequences (e.g., health problems, missing duty due to alcohol-related illness, arrested for driving while impaired, productivity loss, and not being promoted) than do higher-ranked members (Bray et al., 2003; Lee & Hachey, 2011). This finding is often irrespective of age. For example, non-commissioned members (NCMs) tend to drink more than officers (e.g., Lee & Hachey, 2011).

Overall, the negative effects of alcohol are indisputable. Certain conditions of military employment (e.g., exposure to combat experiences, length of time away from home, lower rank) have been positively associated with alcohol use, dependency, and alcohol-related problems, which also appear to be influenced by the military's culture (e.g., ritualized drinking; pro-alcohol-misuse culture). These phenomena may be perceived as stressors by military members, and stressors have been positively related to alcohol consumption. However, the associations between stressors and alcohol consumption are not straightforward, as both are affected by individual differences (e.g., sex, age,

generation). This issue will be further explored in the following review of the stress and strain literature in relation to alcohol consumption.

### **The Stressor-Strain-Alcohol Consumption Association**

Stress is a well-recognized condition of modern living. It has been studied in numerous domains, ranging from life to work, including specific work conditions (e.g., high stress and high-risk occupations like the military; Blume et al., 2010; Clarke-Walper et al., 2013; Cooper, Dewe, & O'Driscoll, 2001; Griffin & Clarke, 2011; Herold & Conlon, 1981; Kahn & Byosiére, 1992; Lazarus, 1991; Wilk et al., 2010). In the stress process, stressors are the drivers and refer to the "demands experienced by individuals" (e.g., excessive workloads, trauma, violence), strains are the individual's psychological, physical, and behavioural responses to stressors (e.g., anxiety, depression), and the outcomes are the consequences associated with stressors and strain (e.g., alcohol consumption; Cooper et al., 2001; Griffin & Clarke, 2011, p. 359; Viswesvaran, Sanchez, & Fisher, 1999). Stress represents the physiological reactions to a stressor (e.g., increased heart rate; Blanc & Kelloway, 2014; Sayette, 1993). A stressor is a perceived demand consisting of both external stimuli (e.g., from the environment) and internal perceptual processing, such that perceptions of and reactions to a stressor are a *transactional process* (Griffin & Clarke, 2011; Kahn & Byosiére, 1992; Lazarus, 1991, p. 1). The impact of stressors on mental and physical health has been well documented. Achieving a better understanding of the factors that influence the stressor-strain relation continues to be the objective of much research (Griffin & Clarke, 2011; Lazarus, 1991). While research on stressors identifies the characteristics of conditions that negatively impact health, research on strain attempts to identify the consequences of stressors by way of the physical,

psychological, or behavioural responses to stressors (i.e., the outcomes; Cooper et al., 2001; Herold & Conlon, 1981). The research question is often how can one person function after facing the same stressor that caused strain in another person (e.g., Kahn & Byosiere, 1992)? What variables assist individuals to function in the face of a stressor without negative effects? Coping mechanisms, or the attempt to deal with strain, improve capability, or avoid the onset of stress, can include alcohol consumption (Herold & Conlon, 1981). Although there are many competing and complementary theories of the stress process, most stress theorists would agree that, first, a stressor is encountered and, when there are insufficient resources available to deal with the stressor, then, strain occurs. This process can, in turn, trigger maladaptive behaviours, specifically alcohol use and abuse (Cooper et al., 2001).

### **Stressor Models**

Numerous stressor models have attempted to explain alcohol consumption since the 1940s (e.g., Masserman & Yum, 1946), but the stressor and alcohol consumption associations are complex and multi-dimensional. Although “the notion that exposure to work stressors promotes employee substance use . . . is widely accepted” (Frone, 2013, p. 75), the failure to find consistent relations in a model that seems intuitive can be attributed to several important features. Stressor-alcohol consumption models need to carefully consider the theoretical underpinning, the identification of appropriate influencing factors (including mediating or moderating factors), the context, and the target population.

**Theoretical grounding.** Many theoretical models posit that alcohol is used as a method to cope with the strain (e.g., negative emotions, depression) that results from

stressors (e.g., work environment; Fergusson, Boden, & Horwood, 2009; Frone, 1999). The first model to explain this relation—the tension-reduction theory—argued that (a) stressors produce an internal state of anxiety and tension; and (b) alcohol consumption reduces the intensity of stress, anxiety, or fear (Conger, 1956; Copper, Russell, Skinner, Frone, & Mudar, 1992; Hopf et al., 2011). The theory goes a step further to posit that drinking in response to stressors, to reduce them, is learned, and that “it is learned because it is rewarding” (Conger, 1956, p. 296). Simply put, “in times of stress people will be especially motivated to drink alcohol” (Sayette, 1999, p. 250). The two-step process where (1) stressors lead to tension and, then, (2) alcohol reduces this tension, results in one being returned to a near-normal state of healthy functioning (i.e., homeostasis; Hopf et al., 2011). Support for this theory has also been found in clinical observations where alcohol and drugs are used “in an effort to self-medicate and cope with stress” (Garland, Boettiger, & Howard, 2011; Epstein, Saunders, Kilpatrick, & Resnick, 1998, p. 224; Schumm, & Chard, 2012). Repeatedly, evidence that people *drink to cope* (e.g., deal with problems, reduce tension) has been found, especially in young adults (Dvorak et al., 2018; Lehavot, Stappendbeck, Luterek, Kaysen, & Simpson, 2014; Merrill & Read, 2010; Miller, Pederson, & Marshall, 2016; Rafnsson, Jonsson, & Windle, 2006). Furthermore, a bidirectional association has been found where, at certain times, alcohol consumption reduces stress and, at other times, stressful situations motivate individuals to consume alcohol (Sher, Bartholow, Peuser, Erickson, & Wood, 2007).

Since being proposed, tension-reduction theory has been adapted in several ways. As a first example, the stress-response dampening theory, adapted from the tension-reduction model, proposes that alcohol provides relief or insulation from the effects of

stress that lead to increased alcohol consumption (Sher & Levenson, 1982). Research has illustrated that alcohol has “a dampening effect on the response to tension/stress on several objective measures” (Dvorak et al., 2018, p. 379). Support for the stress-response dampening theory has been found in various contexts, such as drinking before work to dampen the stress associated with work (Frone, 2004). The stress-response dampening theory (Levenson, Sher, Grossman, Newman, & Newlin, 1980) also recognizes that responses to stressors can be influenced by factors other than the stressor itself (e.g., personality, emotion, sustained attention, affect regulation; Dvorak et al., 2018; Levenson et al., 1980; Sher & Levenson, 1982; Sher et al., 2007) and it provides an alternative explanation for alcohol consumption.

Conversely, Koob (2003) proposed an alternative and less adaptive model of the tension-reduction hypothesis—allostasis—where alcohol consumption is driven by negative reinforcement, which is caused by the negative experience of withdrawal and removal of the positive and pleasing effects of alcohol (Hopf et al., 2011). Combined, this association with alcohol could further lead to addictive behaviours (Hoft et al., 2011).

Alternatively, the transactional theory of stress may provide another explanation for increased alcohol consumption. Specifically, this theory takes into consideration the dynamics of the psychological mechanisms of cognitive appraisal and coping that occur in response to a stressor (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Lazarus, 1991). This two-step appraisal process is initiated when an individual first perceives and appraises a stressor (primary appraisal) and attributes some meaning to the encounter (e.g., harm, threat of harm, or a challenge). Next, an individual identifies and appraises their ability and resources to cope with the stressor (secondary appraisal;

Lazarus, 1991). Coping is a “person’s constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the person’s resources” (Folkman et al., 1986, p. 993). The stress-coping process involves individuals transacting with their environments, appraising and attributing meaning to the stressor, and attempting to cope with the issues that arise from this process (Cooper et al., 2001). The three types of coping strategies resulting from the transactional process—problem-focused, emotionally-focused, and avoidant strategies—have been associated differently with stress-induced alcohol consumption (Copper et al., 1992). Not surprisingly, individuals who use avoidant-coping strategies and lack problem-focusing coping strategies have been found to be more likely to drink when faced with stressful events (Copper et al., 1992; Corbin, Farmer, & Nolen-Hoekesma, 2013). Accordingly, those with limited alternatives and ineffective coping strategies may chose to consume alcohol to avoid the strain caused by the stressors.

A common thread across these models is the notion that alcohol use may be consumed in order to reduce one’s emotional responses to stressors. While the tension-reduction theory posits that people drink when unable to cope with a stressor (Conger, 1956; Colder et al., 2010; Epstein et al., 1998; Seeman et al., 1988), the stress-response dampening theory expands on that premise by capturing the use of alcohol for its numbing properties prior exposure to stress. The allostasis theory focuses on the continued use of alcohol to avoid the negative symptoms associated with alcohol withdrawal. Thus, most stressor-alcohol consumption models can be seen as adaptations of the tension-reduction theory. When all are considered, all or most point to increased feelings of strain in response to stressors which can result in the use of alcohol to reduce

strain. Many of them also make room for considering individual differences in this process. Therefore, these aspects were considered when developing the proposed stressor-strain-alcohol consumption model.

**Influencing factors.** It has been recognized that the relation between stressors and alcohol consumption is better understood when considering the factors that may mediate this complex relation. In a work context, the failure of the simple cause-effect model to obtain consistent support has been attributed to two limitations: (a) employees can use other coping strategies (e.g., support, leisure activities); and (b) even if data supports that stress is related to alcohol consumption, there is no information as to why. Using a simple cause-effect model fails to take into consideration intervening variables (e.g., mediators; Frone, 1999). In earlier research, intervening variables were aptly described in a synopsis of the social stress process as “combining three major conceptual domains: the sources of stress, the mediators of stress, and the manifestations of stress” (Pearlin et al., 1981, p. 337). Much research has focused on understanding what influences this complex process. Accordingly, there has been a call for conceptualizing more complex mediating models as one way to provide more in-depth analyses of the relations between stressors and alcohol consumption (Griffin & Clarke, 2011; Herold & Conlon, 1981; Pearlin et al., 1981).

Research on mediation models attempts to ascertain “*why or by what mechanism*” stressors are related to alcohol consumption (Frone, 1999, p. 288). Frone’s (1999) moderated mediation model has received considerable support because it extends beyond the simple, direct relation between stressors and alcohol consumption to understand why, and under what conditions, stressors lead to alcohol consumption (e.g., Hagihara et al., 2003). By way of an example, mediation models have found that the association between

job characteristics (e.g., high work demands, low control, poor interpersonal relationships with supervisors and coworkers) and alcohol consumption have been mediated by negative emotions (e.g., anxiety, negative affect, job dissatisfaction; Frone, 1999). The need to control for alcohol-related demographic characteristics, which also qualify as intervening variables in an alcohol consumption scenario, warrants repeating because of the well-established association.

**Context.** The search for an accepted and supported stressor-strain-alcohol consumption model is ongoing. It has been recognized that to understand what factors influence (i.e., mediate) the various stress model linkages, the model must be tailored, context-specific, and include meaningful differences (e.g., distinct subpopulations) that would enhance our understanding of these complex inter-relations (de Jong et al., 2001; Herold & Conlon, 1981; Steward, 1996). Context has been recognized as an important factor in determining the impact of stressors and the subsequent strain on alcohol consumption. For instance, the military is a unique work environment that is accompanied by varying degrees of stress, depending on whether stress is assessed in garrison—a relatively innocuous environment—or after operations, which can present strain due to being away from home, living in harsh conditions, threat of injury or death, and exposure to combat (e.g., Dolan & Enders, 2008). Because military members tend to consume higher quantities of alcohol and are faced with higher stress and dangerous working environments than civilians, the high-stressor environment in the military context is ideal to study a stressor-strain-alcohol consumption model.

**Population.** Although mixed findings in work stressor models have been attributed to the context-free measures of work (e.g., national studies spanning numerous

work environments; Frone, 2004, 2008), another factor contributing to the lack of consistent findings is the sample population under study. Often, studies measure a sample of the general population based on a national survey (e.g., U.S. National Survey of Workplace Health; Frone 2008). A national study contains a heterogeneous sample in terms of alcohol consumption and risk factors, which could yield misleading results when averaged across participants. Associations between these variables could be significant and meaningful in populations thought to have either higher than normal levels of stressors and/or higher levels of alcohol consumption. As such, tailoring a model to a target population for a specific context, while identifying intervening factors and controlling for alcohol-related demographics would address deficits noted in previous stressor-strain models attempting to predict alcohol consumption. Accordingly, the creation of such a model designed to predict alcohol consumption would require a careful examination of specific types of stressors that might, more or less, contribute to alcohol consumption.

### **Stressors and Alcohol Consumption**

Life stressors and alcohol consumption have been consistently positively related (Blume et al., 2010; Harris & Heft, 1992; San José, van Oers, van de Mheen, & Garretsen, 2000), perhaps because of the “notion that alcohol consumption can reduce stress is taken for granted by most people” (Sayette, 1993, p. 459). Yet, there is considerable variability in individuals’ use of alcohol in reaction to stressors (e.g., many stressed individuals abstain from alcohol consumption; Blume, 1984). Similarly, there is variability in the impacts of using alcohol to deal with stressors, with this resulting in exacerbated psychological distress in some cases (Hansell & White, 1991) and alleviate it

in other cases (e.g., depressive symptoms; Neff & Husaini, 1982). A bidirectional relation has also been noted, as alcohol consumption can sometimes reduce stress and sometimes stressful situations can motivate alcohol consumption (Sher et al., 2007).

Further complicating the alcohol/stressor association are the types of stressors in question. These may range in severity (from mild to traumatic), frequency (from once to multiple exposures), duration (from brief to cumulative over one's life span), and impact, with more severe and traumatic stressors often producing lasting effects (de Jong et al., 2001; Pearlin et al., 1981; Tennant, 2002). It is because of these numerous factors that a comprehensive stressor/strain model should attempt to capture as many of these factors, over as long a period as possible. Stressors that might be considered include a range of (a) daily life stressors, because their impact can be considerable; and (b) traumatic stressors, because it is important to not only focus on the worst traumatic event experience due to their cumulative nature.

**Negative life experiences.** In daily life, stressors are unavoidable and can occur in every aspect of one's personal life (e.g., interpersonal conflict, divorce, family death) or professional life (e.g., high work demands, difficult boss/coworkers, unemployment; San José et al., 2000; Tosevski & Milovancevik, 2006). The impact of day-to-day life stressors cannot be underestimated because, in addition to causing physical health problems (Tosevski & Milovancevik, 2006), they have been known to influence individuals' ability to cope with stressors in the long term, ultimately impacting mental health (e.g., violence and combat; King, King, Fairbank, Keane, & Adams, 1998; Tennant, 2002). Various stressful life events have been positively associated with alcohol use and abuse (e.g., relationships, separation, divorce, work, unemployment; Richman et

al., 2012; San José et al., 2000). Some negative life events include exposure to trauma, witnessing violence or being the victim of a fire, flood or accident. Such events have been linked with an increased risk of alcohol/drug addiction (Brown, Vik, Patterson, Grant, & Schuckit, 1995; Enoch, 2011; Killgore et al., 2008; Uhart & Wand, 2009; Waldrop, Santa Ana, Saladin, McRae, & Brady, 2007; Wilk et al., 2010). It has been recognized that stress symptoms may be related to stressors experienced over the course of one's life. In fact, exposure to a multitude of traumatic events has been linked not only to PTSD (de Jong et al., 2001; Friedman, Resick, & Keane, 2014; Galea et al., 2002; King et al., 1988 ), but also to depression, other anxiety disorders, and alcohol/drug abuse/dependency (Friedman et al., 2014; Galea et al., 2002). Thus, when considering factors that contribute to alcohol consumption/alcohol abuse, assessing previous exposure to a wide range of life stressors is important.

**Violence.** Exposure to violence has been shown to be a particularly traumatic stressor that produces long-lasting effects. Violence can range from being threatened with a weapon (e.g., knife, gun) to being physically assaulted (e.g., being beaten or raped), and frequently occurs within trusted interpersonal relationships (Weaver & Clum, 1995). In an early meta-analysis, violence was found to be positively related to psychological distress and disorders (e.g., PTSD, anxiety, depression, dissociative disorder; Weaver & Clum, 1995). In addition to a higher incidence of psychological distress, exposure to violence has been positively related to alcohol consumption and dependence (Savarese, Suvak, King, & King, 2001; Steward, 1996). Within the CAF, a substantial number of recruits (69.3%) reported having been exposed to at least one violent or traumatic event prior to enrolment (Lee, Sudom, & Zamorski, 2013b).

**Adverse childhood experiences.** Adverse childhood experiences, a specific sub-category of negative life events, has emerged as an important factor to consider due to the overwhelming evidence of the long-term impact of these experiences. They include various forms of abuse (e.g., emotional abuse, physical abuse, domestic violence, sexual abuse), neglect (e.g., physical and emotional neglect), and problematic family history (e.g., family history of mental illness, and family history of alcohol problems; Cabrera, Hoge, Bliese, Castro, & Messer, 2007; Gahm, Lucenko, Retzlaff & Fukada, 2007; Hammen, 2005; Lee, 2008). Studies have shown that adverse childhood experiences are positively related to numerous negative physical (e.g., cancer, diabetes, obesity, heart disease, suicide), psychological (e.g., PTSD, depression, stress-related somatic syndromes), and behavioural outcomes in adulthood (e.g., alcohol abuse, binge drinking, marrying an alcoholic, alcoholism; Anda et al., 2006; Briggs, Thompson, Ostrowski, & Lekwauwa, 2011; Catani, Jacob, Schauer, Kohila, & Neuner, 2008; Crofford, 2007; Dube, Anda, Felitti, Edwards, & Croft, 2002; Fairbank, Putnam, & Harris, 2014; Felitti et al., 1998; Hammen, 2005; Steward, 1996). The risk of developing these problems in the future—*polyvictimization*—is cumulative and is positively associated with the number of types of childhood maltreatment and adversity experienced, especially after exposure to three or more events (Dube et al., 2002; Fairbank et al., 2014; Felitti et al., 1998).

For military members, exposure to adverse childhood experiences has also been positively related to depression and PTSD, above and beyond the effects of combat exposure (Agorastos et al., 2014; Cabrera et al., 2007; Clarke-Walper, Riviere, & Wilk, 2013). In the CAF, exposure to adverse childhood experiences has been associated with poorer mental health among recently deployed military members (Lee, Phinney, Watkins,

& Zamorski, 2016). Evidence from past studies provides overwhelming support for the strong relation between adverse childhood experiences and alcohol-related problems (Briggs et al., 2011; Dube et al., 2002; Steward, 1996).

**Combat.** Exposure to the horrors of war is an occupational hazard of serving in the military. Throughout the recorded history of war, exposure to combat was recognized as having a negative impact on mental health post-deployment (e.g., anxiety, depression, PTSD; Fear et al., 2010; Hoge et al., 2004; Wagner & Jakupack, 2012; Xue et al., 2015). Not surprisingly, a concerted effort has been made to examine the influence of combat experience on other negative outcomes. One of the most prolifically studied outcomes—PTSD—has been purported by some to be attributed most to combat experience (Gilbertson et al., 2010). In the CAF, 13.5% of members who served in Afghanistan—*an important minority*—reported some type of mental illness upon return, with PTSD being the most prevalent (8%; Boulos & Zamorski, 2013, p. 551). Goodwin and Rona (2013, p. 398) and others (Castro & Adler, 2011) have surmised “it is not the deployment per se, but the combat exposure during deployment . . . which was highly associated with PTSD.”

***Combat exposure and alcohol consumption.*** Not surprisingly, as a stressor, combat exposure has been linked to alcohol consumption, abuse, and problems (Fear et al., 2010; Gallaway, Fink, Millikan, Mitchell, & Bell; 2013; Wilk et al., 2010; William et al., 2015). Research has also shown a trend, indicating that military personnel exposed to war zones and combat consume more alcohol during and after their deployment than military members who were not exposed to combat (Mehlum et al., 2006). This association was stronger for those who were employed in a combat role (e.g., infantry)

and exposed to combat events, with the number of combat events being positively associated with alcohol consumption (e.g., mortar attack, encountering sniper fire, witnessing personnel being wounded or killed; Fear et al., 2010; Mehlum et al., 2006; Wilk et al., 2010). This positive association also extends to problem-drinking relapses, alcohol misuse, and alcohol-related behavioural problems, with stronger associations for those who thought they might be killed, were threatened with death or injury, or were exposed to atrocities (Browne et al., 2008; Hooper et al., 2008; Wilk et al., 2010; Williams et al., 2015). Fortunately, in the longer term, not only has the association between deployment and alcohol consumption been found to decrease over time (e.g., four- and five-years post-deployment; Fear et al., 2010); so has the association between combat exposure and alcohol consumption (Hooper et al., 2008).

*Pre-combat exposure.* However, due to the cumulative nature of psychological disorders (e.g., PTSD, depression), some researchers have questioned whether the influence attributed to combat exposure on psychological disorders was exaggerated, as the impact of previously existing mental health problems were unknown (Norris, Maguen, Litz, Adler, & Britt 2005; Rona et al., 2009). Some studies have provided evidence that pre-existing mental health problems increase vulnerability, especially after exposure to combat (e.g., Rona et al., 2009).

Combined, these four stressors, namely negative life events, violence, childhood adversity, and childhood neglect, have been shown to be associated with a range of alcohol-related problems. As equally diverse as the stressors that lead to alcohol consumption are individuals' reactions to stressors—strain. Strain can often account for some of the negative associations between stressors and outcomes, and provide insight

into individuals' inability to cope with stressors. Strain, as a knock-on effect of stressors, can also influence decisions to consume alcohol in turn.

### **Strain and Alcohol Consumption**

Strain has been conceptualized and measured in many ways that vary according to the model being assessed. Strain can directly affect outcomes and indirectly influence other components of the stress process (e.g., strain can mediate the association between stressors and stress outcomes; Pearlin et al., 1981). Common indicators of strain are psychological conditions, such as depression, anxiety, and PTSD. Research on stressor-strain models can be confusing, however, because what is used as an indicator of strain in one study (e.g., depression) may be used as an outcome of strain, or dependent variable, in another study (e.g., the association between stressors and depression is mediated by strain, defined as somatic symptoms; Cooper et al., 2001). Strain can be attributed to the person (e.g., personality, personal resources, resilience), the environment (e.g., workload, organizational resources, role demand, economic changes), or an interaction of the person and the environment (Herold & Conlon, 1981; Pearlin et al., 1981).

**Depression.** The strong association between depression and stressors, especially negative life events, has consistently been found in adults and adolescents (Hammen, 2005; Pittenger & Duman, 2008; Tennant, 2002; Yang et al., 2010). The severity of stressors has been strongly associated with the severity of depression (Tennant, 2002), and the same can be said for the association of depression with alcoholism (Swendsen & Merikangas, 2000). Depression is related to gender and age, with females and youths reporting significantly higher levels than their counterparts (Conner, Piquart, & Gamble, 2009; Weitzman, 2004). Within day-to-day military work environments (not deployed on

operations), stressors (e.g., work overload, inadequate staffing, long hours, difficult supervisor) have been found to be positively related to depression and reduced performance (Pflanz, 2006). For U.S. veterans, the prevalence of depression has been considerable (ranging from 14% to 17%), and it is often comorbid with PTSD (Wagner & Jakupack, 2012). Depression has also been found to be one of the most prevalent mental health disorders among CAF members (lifetime prevalence of 15.7%; Pearson, Zamorski, & Janz, 2014).

*Depression and alcohol.* Alcohol abuse and depression are common co-occurrences in adults and young adults (aged 18 to 24 years of age; Conner et al., 2009; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Nolen-Hoeksema & Harrel, 2002). Depressed individuals tend to drink more, report more drinking-related problems, and abuse alcohol more than non-depressed individuals, after controlling for age, sex, and race (Keough, O'Connor, Sherry, & Stewart, 2015; Weitzman, 2004). Not only has this comorbid relation been demonstrated, it has also been shown to persist over time, and the existence of both disorders tends to exacerbate the severity of both (Swendsen & Merikangas, 2000). In addition, depression has had a stronger association with alcohol dependence than with alcohol abuse (Swendsen & Merikangas, 2000). Nonetheless, the debate of whether individuals drink to self-medicate against the symptoms of depression or whether alcohol abuse leads to major depression continues, with some results supporting the latter argument (Fergusson et al., 2009). Evidence of increased solitary drinking among depressed individuals can further exacerbate the association between alcohol-related problems and depression (Keough et al., 2015).

**Anxiety.** Anxiety levels are higher among deployed veterans relative to non-deployed veterans (e.g., Gulf War veterans; Wagner & Jakupcak, 2012). Alcohol consumption and dependence has been positively associated with life anxiety and anxiety disorders (Schadé et al., 2007). Comorbidity is a serious concern as it is “the rule rather than the exception in the case of psychiatric disorders,” but especially with alcohol use disorders (Schadé et al., 2007, p. 109). A study of comorbidity patterns found that 45% of participants with alcohol dependence also had an anxiety disorder (Merikangas, Dierker, & Szatmari, 1998). Uhart and Ward (2009) suggested a causal link between alcohol dependence and anxiety because anxiety disorders tend to precede substance use disorders. Accordingly, the tension-reduction theory explains that those high in anxiety would be sensitive to the anxiety-reducing effects of alcohol, and this would lead them to consume alcohol to reduce distress (Nitka & O’Connor, 2017).

**PTSD.** PTSD is a widely recognized indicator of strain, particularly in reaction to traumatic events (Weisaeth, 2014). Although attributed to a myriad of traumatic events (e.g., assault, rape, childhood sexual and physical abuse, adverse childhood experiences), PTSD is widely recognized as an outcome of the strain related to combat exposure regardless of the war (e.g., Vietnam, Gulf, Iraq, Afghanistan; Monson, Friedman, & La Bash, 2014; Norris & Slone, 2014; Wagner & Jakupcak, 2012; Weisaeth, 2014).

A robust finding of epidemiological research is the *dose-response relationship* between the severity and frequency of exposure to trauma and the onset of PTSD (Friedman et al., 2014; Wagner & Jakupcak, 2012). For example, in the U.S., where lifetime trauma exposure is 50-60%, the lifetime prevalence of PTSD is only 6.4%, whereas in Algeria, where the lifetime trauma exposure is 92%, the PTSD prevalence rate

is 37% (de Jong et al., 2001; Pietrzak et al., 2011). In U.S. military veterans, the prevalence of PTSD has varied based on the nature of the war and war-specific demands within each deployment (Hoge et al., 2004; Kang, Natelson, Mahn, Lee, & Murphy, 2003). In this era, PTSD is one of the most common disorders in U.S. soldiers repatriated from Iraq (9.8%) and Afghanistan (4.7%; Hoge, Auchterlonie, & Milliken, 2006), and has been reported to be as high as 22% in U.S. veterans (Wagner & Jakupcak, 2012). Similar levels of PTSD have been found in CAF members deployed in support of the Afghanistan mission (roughly 8%; Pearson et al., 2014). Most would not be surprised by this level of PTSD given that combat exposure was shown to have been experienced by 39% of all U.S. veterans across wars in one study (Norris & Slone, 2014). Nonetheless, despite massive exposure to trauma “around the world, the lifetime prevalence rate is [only] 7%” (Norris & Slone, 2014, p. 113), leading to the conclusion that not all who are exposed to trauma develop PTSD. Regardless of the plethora of research done on PTSD, there is still only a small, but important, minority who develop PTSD (Boulos & Zamorski, 2013, p. 551; Rona et al., 2009). In fact, because being diagnosed with PTSD itself is so rare, some researchers studying PTSD focus on posttraumatic symptoms (PTS) rather than the diagnosis, or probable diagnosis, for PTSD itself (Adler et al., 2005).

The fact that the majority of those who are exposed to traumatic events do not develop PTSD caused a shift from examining the impact of individual stressors on PTSD (e.g., combat exposure) to determining what makes people susceptible to PTSD (Norris & Slone, 2014). The examination of risk pathways to PTSD led Vogt and colleagues (2014) to develop a risk-factor framework that provides clarity on current PTSD theories and results. They categorized risk factors (e.g., age) along a linear time continuum: before

(pretraumatic), during (peritraumatic), and after the exposure to trauma (posttraumatic; Vogt, King, & King, 2014). Like alcohol consumption and alcohol-related problems, pretraumatic risk factors positively related to PTSD include: (a) pre-existing attributes (e.g., female, younger age, lower intelligence, lower socio-economic status, pre-existing mental disorders); and (b) prior experiences (e.g., prior exposure to trauma, family psychiatric history). Peritraumatic risk factors focus on numerous features of the traumatic event (e.g., the severity, degree of involvement, one's reaction to it, injury, and *life threat* of the event). Posttraumatic circumstances include a lack of social support and other additional posttraumatic stressors (Vogt et al., 2014). The risk-factor framework highlights the need for temporal precedence in identifying PTSD risk factors, which has been recognized as essential, because it provides the opportunity to assess the cause or antecedents of PTSD versus relying on cross-sectional studies (e.g., Kraemer et al., 1997; Uhart & Ward, 2009; Vogt et al., 2014).

Unfortunately, PTSD has been found to influence other factors. Consequently, it has also been recognized as an indicator of strain (King, Taft, King, Hammond, & Stone, 2006). PTSD is consistently comorbid with other psychological disorders, including depression and other anxiety disorder symptoms (Basile, Arias, Desai, & Thompson, 2004). For example, Kessler and colleagues (1995) found that 79% to 88% of individuals with PTSD also meet the criteria for a least one other psychiatric diagnosis.

***PTSD and alcohol consumption.*** As discussed earlier, studies have consistently found comorbidity between PTSD and substance abuse, including alcohol abuse (Burnett-Zeigler et al., 2011; Donovan et al., 2001; Pietrzak et al., 2011), with the highest comorbidity rate being with alcohol abuse (Pietrzak et al., 2011; Steward, 1996). An

examination of substance abusers found 40% to 60% of them also suffer from PTSD, while 60% to 80% of PTSD sufferers are also substance abusers (including alcohol abuse; Kofoed, Friedman, & Peck, 1993). Within veteran populations, those suffering from PTSD have reported a higher lifetime use of alcohol than those who screened negative for PTSD (Saxon et al., 2001). Research has not unravelled the causal nature of this association, but models have suggested that: (a) alcohol abuse causes individuals to be vulnerable to PTSD, (b) sufferers of PTSD self-medicate with alcohol and substance abuse, and (c) one disorder might sustain the other disorder (Jacobsen, Southwick, & Kosten, 2001; North, Kawasaki, Spitznagel, & Hong, 2004; Steward, 1996; Taft et al., 2007; Uhart & Ward, 2009). For these reasons, there is a high interest in understanding the effects of PTSD on CAF members who were deployed to Afghanistan.

***Combat exposure and PTSD.*** Both PTSD and combat exposure have been associated with higher alcohol consumption, problems, and abuse post-deployment (Hoge, Riviere, Wilk, Herrell, & Weathers, 2014; Milliken et al., 2007; Smith et al., 2014). Drinking-to-cope motives and perceived stigmas of seeking mental health treatments mediate the association between PTSD, as predicted by combat experience, and alcohol consumption (Miller et al., 2016). Therefore, because of the comorbidity between mental health and alcohol consumption, research has often focused on the interrelation between the two in the context of combat exposure (Hoge et al., 2004; Milliken et al., 2007; Smith et al., 2014).

Research has demonstrated a disconcertingly high association between each of these three strains—depression, anxiety, and PTSD—and alcohol consumption. Research also shows a high prevalence of these strains in military members. However, the multi-

directional relation between alcohol consumption and strain adds a layer of complexity to understanding the impact of both on individuals. The complexity of this relation is further exacerbated by comorbidity between alcohol consumption and each of depression, anxiety, and PTSD, especially in military members (Burnett-Zeigler et al., 2011). They are not only found to be comorbid with alcohol consumption, but also with one another. Yet, as the tension-reduction theory would posit, one mechanism explaining these relationships may be that those suffering from psychological distress (i.e., strain) engage in alcohol use to reduce distress resulting from their experience with stressors (Epstein et al., 1998). Combined, these factors provide the basis for a stressor-strain-alcohol consumption model.

### **Stressors-Strain-Alcohol Consumption (SSAC) Model**

Based on a review of models on stress and alcohol use, a stressor-strain-alcohol consumption (SSAC) model is proposed whereby (a) stressors would be positively associated with alcohol consumption, (b) strain would be positively associated with both stressors and alcohol consumption, and (c) strain would mediate the associations between the stressors and alcohol consumption. This model tailored for a high-stress context (i.e., military environment) and target-population (i.e., military) addresses some shortfalls of previous stressors models.

**SSAC model and generation.** Extending beyond the military culture, the influence of generation is also expected to alter the pathways towards alcohol consumption in the SSAC model. As mentioned earlier, each generation's alcohol-related attitudes and behaviours have been shaped by its collective consciousness, which was created during each generation's formative years. Although alcohol consumption is

expected to vary by generation, it is unknown what pathways may lead to increased alcohol consumption for each generation. As discussed previously, alcohol permissiveness and alcohol-related behaviours differed in each generation. These alcohol-related generational differences likely extend to attitudes about mental illness, which have changed over time and differ in sub-populations (e.g., negative stigma in macho occupations; Nelson et al., 2011). For example, one would expect Millennials to be more open about and accepting of mental illnesses, perhaps because of their parents were more heavily engaged in all aspects of health, including mental health (Alsop, 2008). As a result, this generation may be more likely to report strain. Conversely, Late Baby Boomers may be less inclined to report or even identify strain, possibly as a result of having been raised during times of less tolerance, understanding, and acceptance of mental illnesses.

Further, one could postulate that generational cognitive schemas related to stressors and how to handle these stressors would be developed differently in each generation. There is some emerging evidence pointing to generational differences in reactions to stressors and approaches to coping with stressors (Lemaire, Wallace, & Jovanovic, 2014; Twenge, 2015; Twenge & Campbell, 2001; Wakim, 2014). This could influence the pathways involved in alcohol consumption. In one study, Millennial nurses were found to report higher levels of perceived stress than older generations (e.g., Gen X and Baby Boomers; Wakim, 2014). Generation also provides another indicator of the context in which members developed coping strategies. Baby Boomer nurses reported higher use of self-controlling behaviours, while Millennials reported higher levels of escape-avoidance coping behaviours than other generations of nurses (Wakim 2014).

Whether these results would generalize to military members is unknown. Nevertheless, results point to generational differences in the experience of and reactions to stressors. The exact nature of differences in the pathways between generations is unclear, but it would appear justified to expect differences in the SSAC across generations.

### **Research Objectives**

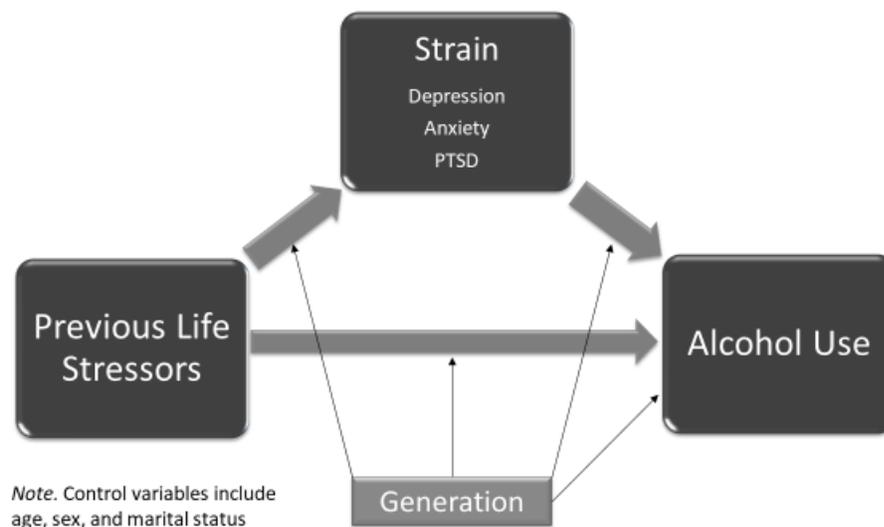
Through the development of a SSAC model tailored for the CAF, the overall objective of this thesis was to enhance the understanding of the factors associated with alcohol consumption among military personnel. This was achieved by conducting two sequential studies using archival data collected in the CAF. In Study 1, the main objective was to understand the roles that various types of pre-military stressors and strain play in predicting alcohol consumption. A SSAC model was assessed where the relation of stressors (pre-military life stressors) with alcohol consumption was mediated by strain, with the aim of providing insight into the nature of these complex relations and interrelations. Expanding from Study 1, the main objective of Study 2 was to assess a post-deployment SSAC model, revised based on Study 1 results, with combat exposure serving as the stressor. Thus, Study 2 provided the conditions for a more rigorous assessment of the impact of combat exposure on alcohol consumption, because it accounted for baseline indicators of previous life stressors, strain, and alcohol consumption identified in Study 1. In both studies, a secondary objective was to determine the role that generation might play in predicting alcohol consumption. More details on the specific objectives and hypotheses of each study are provided below.

**Study 1—Predicting Alcohol Use in the CAF with a SSAC Model**

The military is a target rich environment for high alcohol consumption and alcohol-related problems due to its age composition, high stress work conditions, and culture. Most of CAF members are male (84%) and under 39 years of age (i.e., 68%; CAF Human Resource Management System, 2017). These demographic factors legitimize the serious concerns about alcohol use and abuse, and subsequent alcohol-related problems for the CAF. It is disconcerting that alcohol-related deaths were found, in at least one report, to exceed combat deaths (Tien et al., 2010), confirming the seriousness of alcohol-related concerns. Most militaries have cultures that facilitate alcohol consumption (Ames & Cundradi, 2004; Ames et al., 2009; Poehlman et al., 2011), such that it often exceeds that of civilian populations, even after adjusting for age and gender (Ames et al., 2002; Bray et al., 2006; Browne et al., 2008; Messer et al., 2004; Poehlman et al., 2011).

Research on stress and alcohol consumption has illustrated that complex and multidirectional associations are implicated, resulting in the need to develop models that incorporate multiple factors that may be involved in the pathway between the two (e.g., previous life stressors and strain). The evaluation of a context-specific SSAC model for a population (i.e., CAF) where the impact of previous life stressors may be exacerbated (e.g., stressful demands of military employment) and alcohol consumption has been found to be higher was conjectured to yield stronger and different relations than those previously found. Accordingly, a primary objective of this study was to understand how various types of previous life stressors (i.e., negative life events, exposure to violence, and adverse childhood experiences) influence the alcohol consumption of military personnel, as mediated by strain (i.e., depression, anxiety, and PTSD). The SSAC model

(Figure 1) also explored generational differences hypothesized to influence the stressor-strain model of alcohol consumption. Generation was hypothesized to predict alcohol consumption, over and above age, but was also expected to play a role in shaping the pathways specified in the SSAC model.



*Figure 1.* SSAC model adjusted for alcohol-related demographics.

Because previous exposure to life stressors (i.e., negative life events, exposure to violence, and adverse childhood experiences) has longer-term effects on alcohol consumption, the following hypotheses were made in accordance with the SSAC model.

***Hypothesis 1a–1d:*** Previous life stressors: (a) negative life events, (b) exposure to violence, (c) adverse childhood experience, and (d) childhood neglect, will be positively related to alcohol consumption.

**Hypothesis 2a–2d:** Previous life stressors: (a) negative life events, (b) exposure to violence, (c) adverse childhood experience, and (d) childhood neglect, will be positively related to three types of strain: depression, anxiety, and PTSD.

**Hypothesis 3a–3d:** Strain (i.e., depression, anxiety, and PTSD) will mediate the relations between previous life stressors: (a) negative life events, (b) exposure to violence, (c) adverse childhood experience, and (d) childhood neglect, and alcohol consumption.

**Generational Differences.** This study also sought to contribute to the literature on alcohol consumption by examining generational differences in alcohol consumption and pathways specified in the SSAC. Research has clearly illustrated that not all generations are reducing their alcohol consumption at the same rate as they previously did (Blow et al., 2002a, 2002b; Booth & Blow, 2002; Grant, 1997; Levenson et al., 1998; Moore et al., 2005). Generational differences in alcohol consumption and a paucity of research on generational differences justifies including it as a factor to explain why individuals may have different drinking habits. Although the negative association of age and alcohol consumption holds true with military populations (Lee & Hachey, 2011), the fact that military members of all ages consume more alcohol than their civilian counterparts indicates that military members' decline in alcohol consumption may not mirror the trajectory of decline witnessed in a civilian population (e.g., alcohol consumption may decline more slowly as age increases in a military population). Therefore, if generational differences in alcohol consumption do exist, differences in younger generations (e.g., Millennials) may continue long past the traditional age (e.g., late 20s, early 30s) when alcohol consumption is expected to decline. Towards that end, the prevalence rate in alcohol consumption provided a comparison to assess whether age or generation was

more important in predicting alcohol consumption. Accordingly, the following hypotheses were proposed:

***Hypothesis 4:*** Generation will explain additional alcohol consumption variance above and beyond age.

***Hypothesis 5:*** CAF members in younger generations, namely iGens and Millennials, will report consuming significantly higher levels of alcohol consumption than older generations (i.e., Gen Xers, Late Baby Boomers, and Early Baby Boomers).

Early research has found that alcohol consumption has differed between generations and that the negative association between age and alcohol consumption is not entirely linear (Greenfield & Kerry, 2003; Moore et al., 2005). It stands to reason that, if generational experiences (e.g., the Great Depression, AIDS, Afghanistan involvement) shape attitudes, values, behaviours (e.g., career experiences, personalities, work values and attitudes, leader behaviors; Lyons & Kuron, 2014), and cognitive schemas (Lyons, Duxbury, & Higgins, 2007), these differences could, in turn, shape a culture for each generation's propensity to handle and react to life stressors (e.g., coping styles). It is argued that generation can be used as a proxy for a range of behaviours in the SSAC model, as generations could differ in their reactions to stressors, the strain they develop and/or report, and the subsequent outcomes to both (e.g., alcohol consumption). Some support for this contention has been found with generations differing in their stress levels, reactions to stressors, and coping strategies (e.g., depression; Lemaire, Wallace, & Jovanovic, 2014; Twenge, 2015; Twenge & Campbell, 2001; Wakim, 2014). The examination of generational differences in the SSAC model at two important points in time is thus another point to consider. However, because the nature of generational

differences in the pathways involved is unclear, the following exploratory question was proposed:

***Exploratory Question 1:*** How do generations differ in the SSAC model pathways? To compare these differences, the SSAC model will be stratified by generation, namely: (a) iGens, (b) Millennials, (c) Gen Xers, (d) Late Baby Boomers, and (e) Early Baby Boomers.

### **Study 2—Post-Deployment SSAC Model**

The pinnacle of many military members' career is the opportunity to fulfill their role in support of an operational mission (Brown, 2004). Despite this motivation, the negative impact of stress related to operational deployments, especially exposure to combat stress, on alcohol consumption has been well established (e.g., Bray et al., 2010). However, little attention has been paid to the cumulative impact of previous life stressors, strain, and alcohol consumption on individuals' reactions to combat exposure. Answering the question, "would combat exposure predict alcohol consumption if predictive factors, such as previous exposure to adverse life stressors, strain, and alcohol consumption, were controlled?" was the main objective of Study 2. The provision of a baseline in Study 1 permitted controlling for pre-existing mental health (i.e., depression, anxiety, and PTSD) before the exposure to combat and onset of related alcohol consumption concerns. An expanded SSAC model based on results of Study 1 was developed (Figure 2). Again, this post-deployment SSAC model explored generational differences hypothesized to influence the stressor-strain model of alcohol consumption.

***Hypothesis 6:*** Alcohol consumption at post-deployment (Time 2) will be higher than alcohol consumption before the deployment (i.e., post-enrolment; Time 1).

Following the steps of Study 1, the hypotheses were first assessed using the model without Time 1 covariates.

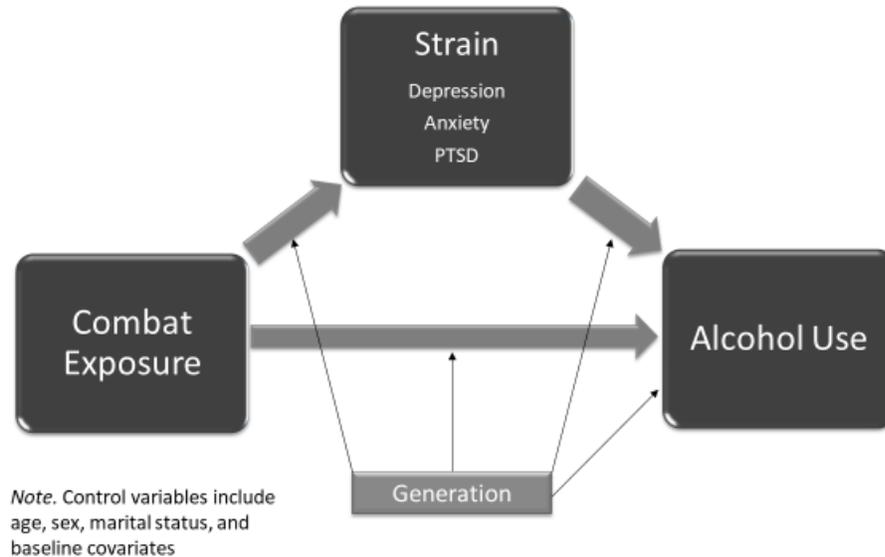


Figure 2. Post-deployment SSAC model adjusted for alcohol-related demographics.

Based on this model, the following hypotheses were proposed:

**Hypothesis 7:** Exposure to combat (i.e., the frequency of exposure) will be positively related to the alcohol consumption.

**Hypothesis 8a–8c:** Exposure to combat (i.e., the frequency of exposure) will be positively related to strain: (a) depression, (b) anxiety, and (c) PTSD.

**Hypothesis 9a–9c:** Strain, (a) depression, (b) anxiety, and (c) PTSD, will mediate the relation between combat exposure and the alcohol consumption.

**Post-deployment SSAC model with Time 1 covariates.** As pre-existing stressors, strain, and alcohol consumption have been shown to be risk factors—pretraumatic risk factors—for some psychological disorders (e.g., PTSD; Vogt et al.,

2014). The influence of these factors on subsequent strain and alcohol consumption was also of interest because exposure to stressors prior to deployment is purported to affect the resiliency/vulnerability of military members to combat (Norris et al., 2005; Rona et al., 2009). A baseline also permits monitoring of the influence health issues associated with military service. Thus, in addition to the use of baseline results to provide a more rigorous test of the post-deployment SSAC model, the following hypotheses were tested.

***Hypotheses 10a–10c:*** Time 1 stressors, strain, and alcohol consumption will predict Time 2 strain and alcohol consumption. Such that, (a) each Time 1 stressor will be positively related to Time 2 strain and alcohol consumption, (b) each Time 1 strain will be positively related to its Time 2 counterpart and Time 2 alcohol consumption, and (c) Time 1 alcohol consumption will be positively related to Time 2 strain and alcohol consumption.

**Generation.** Confirmation about the ability of generation to predict alcohol consumption beyond age was also sought in the post-deployment context.

***Hypothesis 11:*** Generation will explain additional alcohol consumption variance above and beyond age in a post-deployment context.

***Hypothesis 12a-12c:*** CAF members in younger generations, namely iGens and Millennials, will report consuming significantly higher levels of alcohol consumption than older generations in a post-deployment context. Older generations included: (a) Gen Xers, (b) Late Baby Boomers, and (c) Early Baby Boomers.

After Study 1 provided clarification about the differences between generations regarding the SSAC model, the following exploratory question was included:

*Exploratory Question 2:* How do generations differ in the SSAC model pathways in a post-deployment context? Do younger generations (e.g., iGens and Millennials) react more negatively to combat exposure, which, in turn, causes them to consume more alcohol than older generations? Or, do all generations react equally to combat exposure and its influence on strain and alcohol consumption? To compare these differences, the post-deployment SSAC model will be stratified by generation, namely: (a) iGens, (b) Millennials, (c) Gen Xers, (d) Late Baby Boomers, and (e) Early Baby Boomers.

Cumulatively, the two studies therefore assessed 12 hypotheses and two exploratory research questions.

### **Study 1—Methods**

The SSAC model in Study 1 was tested using archival data collected using the CAF Recruit Health Questionnaire—a comprehensive measure of numerous health and health-related factors aimed at assessing recruits' health and wellbeing to (a) improve CAF preventative health programs, and (b) facilitate longitudinal assessment of pre-existing conditions throughout a military member's career (i.e., to provide a baseline from which to measure the influence of health issues associated with military service, identify risk factors for post-deployment issues; Hyams et al., 2002; Lee & Hachey, 2011).

#### **Procedure**

The CAF Recruit Health Questionnaire is a self-report paper-and-pencil tool that was administered in 45-60-minute group sessions to new members within the first few weeks of basic military training between 2003 and 2013<sup>3</sup> (Appendix B; Lee & Hachey, 2011). Response rates are typically high for this voluntary survey (e.g., 70%), with

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<sup>3</sup> Although data collection started in 2003 and continued after 2013, only data collected from the original version of Recruit Health Questionnaire, which was replaced after 2013, was used to permit comparisons in Study 2, which also used the original version of the Recruit Health Questionnaire.

participants providing written consent for use of their responses in future research (e.g., matching with other health data; Lee & Hachey, 2011). Its use was approved by the Defence Research and Development Canada (DRDC) Human Research Ethics Committee (Lee et al., 2013b). For this cross-sectional study, permission to use the archival data was provided by the CAF, Director General Health Services, after ethical approval was granted from the Carleton University Research Ethics Board-B.

### **Participants**

A total of 31,055 newly enrolled CAF members, or recruits, participated. Most participants were unmarried male NCMs (versus officers; Table 1). Seventy-two percent (72%) were 25 years of age or younger ( $M = 23.75$ ,  $SD = 6.08$ ). As expected, most participants were Millennials, and none were Early Baby Boomers, given 55 is the maximum enrollment age. Most participants had achieved high school or higher levels of education, and their household income was in the lower to upper middle range at the time of enrollment (i.e., \$20K to \$100K).

The large size of the sample presents challenges related to power. Opposite of the problems posed by small samples, large samples run the risk of yielding many statistically significant results and potentially failing to reject the null hypothesis when it is true (Cohen, Cohen, West, & Aiken, 2003). Although Cohen and colleagues indicate “there is no harm in exceeding the desired power. . . .and improving the precision of estimates” (p. 181), they also recommending avoiding “overkill” (p. 182). This necessitates consideration of effect sizes, interpretation of results in relation to practical/clinical significance, and conservative  $p$  values (e.g., Bonferroni correction; Aron & Aron, 1994;

Cohen et al., 2003; Kühberger, Fritz, Lerner, & Scherndl, 2015; Tabachnick & Fidell, 2001).

Table 1

*Demographic Characteristics of Study 1 Participants*

Demographic Characteristic	Frequency	Percentage
Sex		
Males	26,486	85.3
Females	4,359	14.6
Rank		
NCMs	24,069	77.5
Officer cadet	6,495	20.9
Marital Status		
Unmarried (includes single, divorced, widowed, and separated)	22,776	73.3
Married (includes living with partner)	7,181	23.1
Generation		
iGens	9	0.1
Millennials	24,531	80.9
Gen Xers	5,067	16.3
Late Baby Boomers	724	2.3
Early Baby Boomers	0	0
Education Level		
Some secondary or high school	3,646	11.7
Completed secondary or high school	10,131	32.6
Some community/tech college/CEGEP	3,939	12.7
Completed community/Tech college/CEGEP	4,820	15.5
Some university courses	3,367	10.8
Completed university degree	3,172	10.2
Post graduate studies	620	2.0
Household Income		
Less than \$20,000	4,641	15.0
\$20,000 to \$49,999	8,150	26.2
\$50,000 to \$100,000	7,018	22.6
More than \$100,000	4,352	14.0
Did not know	5,053	16.3

## Measures

Various scales embedded within the Recruit Health Questionnaire (Appendix B) were used to assess alcohol consumption, stressors, and strain.

**Alcohol consumption.** Eight items across four scales measured alcohol consumption. Due to their similarity with parallel AUDIT items, the responses were recoded to mirror the AUDIT items (refer Appendix C for details). The 10 AUDIT items assess: (a) recent alcohol use, (b) alcohol-dependence symptoms (e.g., morning drinking), and (c) alcohol-related problems (e.g., blackouts). To determine whether the eight alcohol-related Recruit Health Questionnaire items would conform to a similar structure as the 10-item AUDIT, a confirmatory factor analysis (CFA) was conducted in Analysis of Moment Structure (AMOS). The hypothesized three-factor AUDIT model had a good fit with the data,  $\chi^2(17) = 2,339.65$ ,  $p < .001$ , CFI = .956, TLI = .906, and RMSEA = .068 (90% CI of .065 to .070), indicating that the properties of the 8-items were consistent with those of the 10-item AUDIT. A total score was created by adding the eight items, referred to from this point forward as the AUDIT score. The AUDIT score indicates three drinking patterns: (a) *normal*, consisting of scores ranging from 0 to 7; (b) *hazardous (risky)*, consisting of scores ranging from 8 to 15; and (c) *harmful*, consisting of scores of 16 or higher.<sup>4</sup> Acceptable internal reliability was found for the AUDIT score ( $\alpha = .70$ ).

**Negative life events.** This 50-item checklist covers six domains of major life events: work/school, health, personal events, finances, romantic relationships, and home friends/family life (e.g., problems with debts, breakup of a serious relationship; Lee, 2008; McCreary & Sadava, 1998). Participants indicated which life events they experienced in the last year, and then endorsed items were summed with higher scores indicating a higher number of major life events. The scale demonstrated adequate internal consistency (Kuder-Richardson formula [20]  $KR20 = .75$ ).

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<sup>4</sup> The original AUDIT categories are based on the summation of 10 items. As the Recruit Health Questionnaire only had 8 of the 10 items, the original range of scores was revised based on data in Study 2 that was available for both 8 items and 10 items.

**Exposure to violence.** Participants indicated their lifetime exposure to seven violent events (e.g., seriously assaulted, being threatened with a knife) with either 0 (*no*) or 1 (*yes*; Hyams et al., 2002). Responses were summed to provide a total score ranging from 0 to 7 with higher scores indicating more violent events. Modest internal consistency was demonstrated ( $KR20$  was .61).

**Adverse childhood experiences.** Eight items assessed two constructs: childhood adversity and neglect (Cabrera et al., 2007; Gahm, Lucenko, Retzlaff & Fukada, 2007; Lee, 2008). Four of the six items of Childhood Adversity (i.e., emotional abuse, sexual, and physical abuse) were assessed using a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*very often*), and the other two items were assessed using a yes/no (1/0) scale. The 5-point responses were recoded from ratings of 1 to 0 (*no*) and from ratings of  $\geq 2$  to 1 (*yes*). Endorsed items were summed, yielding a range of 0 to 6 with higher scores indicating more experiences (Cabrera et al., 2007; Gahm et al., 2007; Lee, 2008). Childhood Neglect used two positively-worded items originating from the Childhood Trauma Questionnaire (Dong et al., 2004; Dube et al., 2001) to assess physical and emotional neglect using a 5-point Likert-type scale ranging from 1 (*never true*) to 5 (*very often true*; Lee, 2008). Responses were recoded so that higher scores indicated higher levels of neglect and item ratings ranged from 0 (*never true*) to 4 (*very often true*). The items were summed, resulting in a possible score range of 0 to 8. Acceptable internal consistency was demonstrated for the neglect scale ( $\alpha = .78$ ) but the internal consistency was lower for the adversity scale ( $\alpha = .68$ ).

**Depression.** The Patient Health Questionnaire (PHQ) 9-item Depressive Symptoms Scale (PHQ-9) was used to assess symptoms of depression. Participants

responded to the question “in the 2 weeks prior to starting recruit training, how often were you bothered by [insert item]” using a 4-point Likert-type scale indicating frequency: 0 (*not at all*), 1 (*several days*), 2 (*more than half the days*) or 3 (*nearly every day*; Kroenke, Spitzer, & Williams, 2001). The PHQ-9 maps onto DSM-IV diagnostic criteria for depressive disorders (Kroenke et al., 2001; Kroenke, 2010). Although the continuous range of scores was used for all analyses, the categories of levels of depression provided by Kroenke and colleagues (2001) were used to describe the participants: Scores, out of a maximum total score of 27, represent mild (0 to 4), moderate (5 to 9), moderately severe (10 to 14), and severe levels of depression (15 or more), respectively, and a score of 15 meets the diagnostic criteria for depression. Scores between 10 and 14 are also indications of meeting diagnostic criteria, but at a lower level of severity (Nease & Malouin, 2003). Acceptable internal consistency was demonstrated ( $\alpha = .78$ ).

**Other anxiety disorders (OAD).** The 7-item PHQ OAD checklist requires participants to indicate the frequency of various anxiety symptoms using 3-point Likert-type scale: 0 (*not at all*), 1 (*several days*), or 2 (*more than half the days*; Kroenke, Spitzer, Williams, & Lowe, 2010; Spitzer, Kroenke, Williams, & the PHQ Primary Care Study Group, 1999; Spitzer, Williams, Kroenke, Hornyak, & McMurray, 2000). If the first item is responded to using the 0 (*not at all*) rating, participants are instructed to move onto the next scale (i.e., to not answer the remaining six items in this scale). Ratings are summed, resulting in a range from 0 to 27. These represent mild, moderate, and severe levels of OADs with scores of 5, 10, and 15, respectively (Kroenke et al., 2010). The presence of OADs is determined by an algorithm based on responding “2” (*more than half the days*) to the first item (feeling nervous, anxious, on edge, or worrying about a lot about different

things) and “2” to an additional three of the six other items (Lee, 2008; Spitzer et al., 2000). The summed score was used in all analyses and the algorithm was used to describe the number of probable cases of other anxiety disorders. This scale had good internal consistency ( $\alpha = .86$ ).

**PTSD.** The 17-item PTSD Checklist - Civilian version (PCL-C) is a measure of PTSD that was designed for a civilian population (i.e., not military-specific) by adapting it from a version created for Vietnam combat veterans (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers, Litz, Herman, Huska, & Keane, 1993). It was designed based on symptoms of PTSD specified in the DSM-IV and identifies three DSM-IV criteria (Blanchard et al., 1996). Participants respond to a list of problems using a 5-point Likert-type scale ranging from 1 (*not at all*) to 5 (*extremely*) to indicate frequency of occurrence. Item scores were summed, yielding scores that range from 17 to 85 (higher scores indicate more severe PTSD), with the cut-off score of 51 or higher indicating the presence of PTSD (Brewin, 2005; Ruggiero, Del Ben, Scottie & Rabalais, 2003). The PCL-C scale demonstrated excellent internal consistency ( $\alpha = .91$ ).

### **Statistical Plan**

**Data preparation.** Several steps were taken to prepare the data for analysis, following Tabachnick and Fidell’s (2001) suggestions. The initial data cleaning utilized descriptive statistics to identify anomalous responses, which were resolved by either replacing the anomalous response with the appropriate missing value or removing the participant, as warranted. Next, variable scores were computed for those participants who had responded to 80% or more of the variable items, in line with the conventional approach used for calculating scores on measures embedded within the Recruit Health

Questionnaire (Lee, personal communication 20 April 2017). In other words, participants who completed less than 80% of items for a variable would have no score (i.e., missing) for that variable. Next, using variable scores, the missing value analysis (MVA) program in the Statistical Program for Social Scientists (SPSS) was used to assess the degree and nature of missing data (e.g., randomness associated with missing data) and identify potential biases related to the missing data. This was conducted with variable scores and demographic variables, followed by the appropriate imputations, as required, to permit analyses in either AMOS or SPSS. Next, the assumptions of normality were tested, using descriptive statistics, and outliers were examined at the univariate and multivariate levels using Z scores and Mahalanobis Distances, respectively, and regressions. Correlational analyses between the main variables of interest were conducted to test assumptions inherent to the analyses.

**Preliminary analyses.** Several preliminary analyses were conducted prior to testing any hypotheses to determine which alcohol-related demographic variables, of those chosen, would be used as control variables for the study: age, sex, and marital status. First, a regression analysis was conducted to confirm the negative relation with age and the AUDIT score. Next, an analysis of covariance (ANCOVA), controlling for age, compared the effects of sex and marital status on the AUDIT score. Interactions among control variables were also examined. Those alcohol-related demographic variables revealing group differences in the AUDIT score were then used as control variables, whereas those that yielded no significant differences on the dependent variable were not used. Unless otherwise indicated, the control variables were included in all analyses, but were not illustrated in the model for simplicity.

**SEM.** A path analysis was conducted using structural equation modeling (SEM) in AMOS to test the SSAC model in its entirety, as well as the direct and indirect associations within the model between stressors/alcohol, strain/alcohol, and stressors on alcohol through strain. SEM permitted the estimation of specific causal effects in the SSAC model, while controlling for alcohol-related demographic variables. Several steps were followed using SEM. Prior to describing these, the goodness of fit indices selected for all AMOS analyses are described.

*Goodness of fit indices.* Most researchers agree that several indices of fit should be evaluated to assess model fit (Byrne, 2010; Hooper, Coughlan, & Mullen, 2008; Pedhazur, 1997; Tabachnick & Fidell, 2001). Accordingly, four goodness of fit indices were selected: (a) the chi-square test, which examines improvement in model fit but is sensitive to sample size (Hooper et al., 2008; Tabachnick & Fidell, 2001); (b) the comparative fit index (CFI), which compares the hypothesized model with the independence model while taking sample size into consideration (Byrne, 2010); (c) the Tucker-Lewis index (TLI), which compares the hypothesized model and the independence model while adjusting for the negative bias; and (d) the root-mean square error of approximation (RMSEA), which assesses the lack of fit in a model compared to the perfect model (Byrne, 2010; Hooper et al., 2008; Steiger, 1990). Model fit was assessed as good when the following criteria were met: CFI values were over .95 and TFI values were over .95. RMSEA values of less than .05 represented a good fit and values < .10 represented a reasonably close fit (Browne & Cudeck, 1989; Byrne, 2010; Hu & Bentler, 1999). Additionally, Byrne (2010) suggested examining the confidence interval

(CI) range to accompany the RMSEA estimate, as a narrow confidence interval provides further evidence of a well-fitting model (Hooper et al., 2008).

Prior to determining whether there was support for individual hypotheses, additional global-level criteria were reviewed. Specifically, each model was verified to ensure that, at a global level, there was a good fit of the model to the data, thereby providing confidence in the hypothesized result (Gaskin, 2016a). Next, a global test of variance explained, as evidenced by  $R^2$ , ensured that the hypothesized result was meaningful, with sufficient variance in the dependent variable and/or mediation variables explained (Gaskin, 2016a). Lastly, of course, the hypothesis was supported by a significant  $p$  value of  $< .05$  in the predicted direction.

**SEM steps.** First, the measurement model was examined to ensure that the observed variables were accurately predicting the latent variables (Byrne, 2010). A measurement model tests the assumption that the observed items are a valid reflection of the same underlying latent factor(s). The initial assessment of the measurement model using fit indices, SEs, CRs, and squared correlations were reviewed, and based on the findings the measurement model was refined to improve fit (e.g., covarying variables). With confirmation that the observed variables accurately predicted the latent variables, it was determined that unobserved latent variables could be used in the hypothesis model (that is, observed items were calculated into variable total scores, that were then *drawn* as observed variables [i.e., drawn with squares]). Next, the full multiple mediation model was drawn in AMOS using factor scores (observed variables) of interest by: identifying variables as either endogenous or exogenous; drawing regression paths between variables, as hypothesized; permitting variables and/or their error terms to covary; and adding

control variables, which were based on preliminary analyses, to adjust for demographic characteristics associated with alcohol consumption (e.g., age, sex). The confounding effects of these demographic characteristics were controlled vis-à-vis (a) direct paths between alcohol, stressor, and strain variables (Hypotheses 1 and 2), (b) covariance paths with the strain variable error terms, and (c) covariance paths amongst demographic variables. Although controlling the stress and strain variables was not originally part of the model, research supported each of them being related with the control variables, with one exception (i.e., no support was found for an association between Childhood Neglect and marital status). The strain variables were permitted to correlate via their error terms, as recommended (Preacher & Hayes, 2008). In cases when a model was changed, or models were being compared, a chi-square difference test was conducted to compare the two models and indicate the degree of improvement.

*Mediation in SEM.* The significance and strength of indirect effects of strain were examined in AMOS using a combination of a bootstrapping sampling technique and a user-defined estimand (i.e., the indirect user-defined estimand from Gaskin, 2016b).

*Bootstrapping.* Bootstrapping has been recognized as a more rigorous method for testing mediation in comparison to the causal steps approach (e.g., Baron & Kenny, 1986) and the product-of-coefficients approach, more commonly referred to as the Sobel test (Preacher & Hayes, 2008). Bootstrapping is a non-parametric resampling technique that repeatedly draws samples from the database, such that any one data point might be used once, several times, or not at all, and then estimates the indirect effect for each of the resampled data sets (Preacher & Hayes, 2008). The advantages of the bootstrapping approach in comparison to former tests of mediation include not assuming normality of

the sampling distribution, creating confidence intervals (CIs) for the indirect effect (which provide an indication of the population value), having higher power than other methods, and maintaining control over Type I error rate (Preacher, Rucker, & Hayes, 2007; Preacher & Kelley, 2011). Preacher and Hayes especially advocate the use of bootstrapping when assessing multiple mediators concurrently.

When using the bootstrapping approach, Preacher and Hayes (2008) recommend focusing on the mediation relation by placing the emphasis “almost entirely on the direction and size of indirect effects” as assessed with bootstrapping (p. 886). This is breaking away from convention by not including the causal step results (i.e., the Baron and Kenny causal approach). Accordingly, this approach was adopted.

*Indirect estimand.* The multi-mediational effects of strain were examined using an indirect user-defined estimand developed by Gaskin (2016b; Hypothesis 3). This indirect user-defined estimand permits the assessment of the indirect effects of an independent variable on a dependent variable through mediators by: (a) identifying, and thereby constraining, two path coefficient parameters:  $a$  (the path between the independent and mediation variable) and  $b$  (the path between the mediation variable and the dependent variable), respective to the mediation relation; (b) providing a coefficient that is a by-product of the two paths (i.e., two path coefficients are multiplied— $a \times b$ ; Gaskin, 2016c); and (c) employing a bootstrapping sampling technique that produces bias-corrected (BC) CIs at the 95% BC confidence level. Confidence intervals at 95% are most frequently used (Cohen et al., 2003). The coefficient provided by the user-defined estimand is the “product term  $ab$  itself” and, as such, can be used to gauge the effect size (Preacher & Kelley, 2011, p., 95). Gaskin’s (2016b) indirect user-defined estimand is

similar to the Sobel test as it also uses the product-of-coefficients approach and provides significance value. Although no total indirect effects are produced with this user-defined estimand, because it assesses each path one by one, a total indirect effect was derived from a summation of the individual indirect effects (Hayes, 2009). Further, because this series of multiple indirect testing can cause an inflation of Type I errors, the significance of the indirect tests was determined using a Bonferroni-type correction with an adjusted  $p$  value. Two thousand bootstrapping samples, with bias-corrected (BC) CIs at the 95% BC confidence level, were used for each indirect-effect test.

**Generational Differences.** To test whether generation predicts incremental variance in the AUDIT score, over and above age (Hypothesis 4), and generational differences in the AUDIT score (Hypothesis 5a), an ANCOVA was performed, adjusting for the control variables. Where appropriate, post-hoc analyses were performed to identify how the generations differed from one another.

The exploratory question was analyzed using the SSAC model and a four-step process to identify generational differences in: (1) the overall model, (2) the paths, (3) the strength of effects, and (4) the mediating effects of strain on the stressors/AUDIT score relation. In Step 1, first AMOS' multi-group analysis was employed, with the generations identified, and the revised model was assessed for good fit. Next, the multi-group comparison function was used to assess group differences in the model using a chi-square difference test. At this point, the model for each generation was examined. In Step 2, chi-square difference tests were used in AMOS' multi-group comparison function to identify which paths differed between the generations. Each of the 14 paths were examined individually by freely estimating the model, while sequentially constraining the structural

weights of each of the paths to determine whether there were any significant differences among the three generations (a quasi-omnibus test). A chi-square difference test indicated significant group differences on a path, but not which groups differed or how.

Step 3 entailed a series of pair-wise comparisons. Each path found to differ by generation in Step 2 was followed-up with pair-wise comparisons to identify how the generational groups differed with a Bonferroni adjusted  $p$  value being employed. This path-by-path comparison was conducted employing a user-specific estimand—the multigroup analysis estimand—that constrained each path sequentially to facilitate the pair-wise comparisons (Gaskin 2016c), using 2,000-bootstrapping samplings and BC 90% CIs. The user-specific estimand provided direct tests of group path differences and CIs on the pair differences; the former is a more direct test than a chi-square test, which functions through model fit (Gaskin, 2016c).

Step 4 compared mediation differences in the generations. This was achieved by segregating the data by generations, yielding a separate data set for each. For each generation, after confirming model fit, the mediating effects of strain on the association between stressors and the AUDIT score were assessed using Gaskin's indirect user-defined estimand (2016b). The multi-step approach determined what and where the generations differed within the SSAC model, and the mediating effects of strain for generations.

## Study 1—Results

### Data Preparation

During data cleaning, three participants' anomalous responses were removed because it was unknown whether an error was made by the participant or a data entry error occurred ( $N = 31,055$ ).

**MVA.** Each variable score and demographic variable were examined for missing data utilizing MVA to determine the degree and nature of missing data (e.g., randomness associated with missing data). The extent of the missing data was inconsequential for six of the 10 variables (i.e.,  $< 5\%$ ) and considerable for the remaining four variables ( $> 8\%$ ), for which one was very high (OAD; 57.7%). Although all missingness was less than 10%, with one exception, there are no set guidelines for what an acceptable amount of missingness is: Kline (1998) suggested that missing data should be less than 10%, which is the case with this database. The one exception was the OAD variable. Specifically, due to its response design (i.e., skip to the next scale and to not respond to the remaining OAD items), it yielded an unacceptable proportion of missing (92%). After much consideration, the scale was removed from further analyses. In the end, findings suggested that the missing values in this database were missing at random. As such, imputation would be appropriate to deal with the missing values (Tabachnick & Fidell, 2001). However, imputation was not considered appropriate for a sub-set of the sample population ( $n = 2,458$ ) consisting of cases with missing data on more than 80% of the variables. Failing to respond to 80% of the survey was considered an unacceptable degree of missingness, and Kline (1998) had suggested that only 10% or less of missing data was acceptable. As such, these participants were removed from the database prior to

imputation for a resulting database of 28,597 participants. With a better understanding of the extent and degree of missing data, imputation was conducted. The model-based FIML estimation was used to impute missing data whenever possible. For analyses where this was not possible (all analyses conducted in SPSS and analyses involving bootstrapping), an imputed dataset was generated in SPSS employing the expectation maximization (EM) imputation method.<sup>5</sup>

**Normality.** Although alcohol consumption, depression, and PTSD were found to be positively skewed and leptokurtic, analyses were conducted with confidence, as the analyses used are robust to violations of the assumption of normality (e.g., t-test, MANOVA, SEM, regression; Byrne, 2010; Cohen et al., 2003; Glass & Hopkins, 1996; Pedhazur, 1997; Tabachnick & Fidell, 2001). Accordingly, no data were transformed. An examination of outliers revealed that few variables had univariate outliers. However, numerous multivariate outliers were identified, resulting in the removal of 631 participants (as recommended by Tabachnick and Fidell, 2001;  $N = 27,966$ ).

There was no evidence of multi-collinearity, as the highest correlation was below the typical standard of  $r > .70$  (i.e.,  $r = .62$ ; Table 2). As well, collinearity diagnostics provided no evidence of multi-collinearity with low variance inflation factors (VIF;  $< 2$ ) both globally and within each set of variables (i.e., stressors and strain). The descriptive statistics and results of correlation analyses for all variables based on the final dataset are summarized in Table 2.

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<sup>5</sup> Note, because EM does not estimate categorical variables, participants who were missing values on sex and marital status were removed from this database ( $n = 596$ , resulting in  $N = 27,370$ , for these analyses).

Table 2

*Number, Mean, Standard Deviation, and Correlations for Variables in Study 1*

Variables	1	2	3	4	5	6	7	
Alcohol Consumption								
1 AUDIT Score	–							
Stressor								
2 Negative Life Events	.22**	–						
3 Exposure to Violence	.16**	.37**	–					
4 Childhood Adversity	.06**	.21**	.21**	–				
5 Childhood Neglect	.01	.17**	.15**	.32**	–			
Strain								
6 Depression	.10**	.25**	.08**	.15**	.18**	–		
7 PTSD	.14**	.32**	.16*	.18**	.25**	.55**	–	
	<i>N</i>	27,953	27,954	27,832	27,740	27,453	27,797	27,736
	<i>M</i>	5.38	4.52	1.15	1.19	1.15	1.89	20.91
	<i>SD</i>	3.77	4.00	1.19	1.09	1.63	2.53	7.56
	<i>Range</i>	0	0	0	0	0	0	12.00
		32.00	44	5.00	3.00	8.00	21.00	75.00

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

### Preliminary analyses

The impact of certain demographic characteristics on alcohol consumption was ascertained to identify which control variables to include in the model from: age, sex, and marital status.

**Alcohol consumption and age.** A simple linear regression supported the negative relation between age and alcohol consumption (Table 3).

Table 3

#### *Summary of Alcohol Consumption Regressed on Age*

Variable	<i>B</i>	<i>SE</i>	$\beta$	$R^2$	<i>F</i>
AUDIT Score	-.131	.004	-.208***	.043***	1,253.01

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

**Alcohol consumption and demographic characteristics.** A 2 (sex: male vs. females) by 2 (marital status: unmarried vs. married) ANCOVA was conducted with the AUDIT score while covarying with age. The main effects of sex and marital status were significant (Table 4). As expected, males reported significantly higher levels of the AUDIT score ( $M = 5.32$ ,  $SE = .03$ ) than did females ( $M = 4.18$ ,  $SE = .06$ ), and unmarried participants reported higher levels ( $M = 5.13$ ,  $SE = .04$ ) than did married participants ( $M = 4.37$ ,  $SE = .06$ ).

The significant interaction was followed up with a set of one-way ANCOVAs that examined sexes separately. For males, unmarried males had significantly higher AUDIT scores ( $M = 5.80$ ,  $SE = .03$ ) than married males ( $M = 4.94$ ,  $SE = .06$ ),  $F(1, 23,646) = 166.87$ ,  $\eta^2 = .007$ ,  $p < .001$ ; and (b) similarly for females, the unmarried females had significantly higher AUDIT scores ( $M = 4.35$ ,  $SE = .06$ ) than did married females ( $M =$

3.58,  $SE = .08$ ),  $F(1, 4,060) = 55.74$ ,  $\eta^2 = .014$ ,  $p < .001$ . Effect sizes indicate that marital status has a larger effect on alcohol consumption (i.e., the AUDIT score) among females than among males, with unmarried participants reporting higher levels of the AUDIT scores irrespective of sex.

Table 4

*Summary of Between-Subject Effects of Demographics on the AUDIT score*

Variable	<i>F</i>	Hypothesis df	Error df	$\eta^2$
Intercept	3,996.82***	1	27,706	.126
Age	537.12***	1	27,706	.019
Sex	296.27***	1	27,706	.011
Marital Status	116.92**	1	27,706	.004
Sex x Marital Status	52.26*		27,706	.000

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

On closer examination, a series of ANOVAs revealed differences between the control variables. Age was permitted to covary with (a) marital status, as younger participants tended to be unmarried (unmarried  $M = 22.30$ ,  $SE = .04$  and married  $M = 28.41$ ,  $SE = .07$ ), and (b) sex, as males tended to be younger ( $M = 23.40$ ,  $SE = .03$ ) than females ( $M = 25.81$ ,  $SE = .09$ ), but this difference lessened with age (e.g., at 20 years of age females made up only 8.3% of the sample population, whereas at 49 years of age, females made up 35% of the sample population). Sex and marital status were also permitted to covary because a crosstab examination of proportions revealed that, while the ratio of married females (63.3%) to unmarried females (36.7%) was somewhat uneven, the ratio of unmarried males (78.1%) to married men (22.4%) was uneven to an

even greater degree. As such, the control variables were permitted to covary among themselves.

Accordingly, within each analysis, three demographic characteristics were controlled for based on a combination of previous research and the preliminary results: (a) age, a continuous variable; (b) sex: 1 (*male*) and 0 (*female*); and (c) marital status: 1 (*unmarried*) and 0 (*married*).

**Descriptive results.** Overall, participants' averaged responses illustrated low levels of stressors, strain, and alcohol consumption, but standard deviations illustrated the variability in responses (Table 2).

**Alcohol consumption.** The average weekly alcohol consumption for CAF members was 3.69 ( $SD = 3.56$ ) standard drinks. Considering the Low-Risk Drinking Guidelines, a small minority of women drank more than 10 drinks per week (only 1.1% of members) and a lower proportion of men drank 15 drinks or more per week ( $< 1\%$  of members; Canadian Centre on Substance Abuse, 2015). However, 70% of participants reported drinking once a month or more, with 27.5% reporting drinking two times or more weekly. Equally high rates of binge drinking were found for 44.8% of participants, who reported engaging in it one to three times a month, 13% who engaged in it at least once a week, and 7.5% who binge drank more than once a week. The reconfiguration of the original alcohol items from Recruit Health Questionnaire into the AUDIT score provided a method to summarize these alcohol behaviours so as to reflect excessive alcohol consumption and risk patterns ( $M = 5.38$ ,  $SD = 3.77$ ). When AUDIT drinking patterns were examined, it was apparent that many participants were drinking at normal levels (73.8%), but a considerable proportion of participants was consuming alcohol at

hazardous levels (24.8%), and a smaller percentage consumed alcohol at the harmful level (1.4%).<sup>6</sup>

**Stressors.** The number of Negative Life Events reported occurring in the last year ranged from zero to 44 ( $M = 4.54$ ,  $SD = 4.00$ ), while the number of violent events that participants were exposed to over the span of their lives ranged from 0 to 5 ( $M = 1.15$ ,  $SD = 1.19$ ). In terms of stressors experienced in childhood, Childhood Adversity experiences were low ( $M = 1.19$ ,  $SD = 1.09$ , range of 0 to 3), as were Childhood Neglect experiences ( $M = 1.15$ ,  $SD = 1.62$ , range from 0 to 8).

**Strain.** The average level of Depression was low ( $M = 1.89$ ,  $SD = 2.53$ , range from 0 to 21). Most participants reported mild levels of Depression (86.9%), but many participants reported moderate (11.1%), moderately severe (1.8%), and severe levels (0.02%) of Depression. Less than 1% of participants would have met the threshold for major depressive syndrome.

There were 502 participants whose responses indicated a probable diagnosis of PTSD (1.8%;  $M = 20.91$ ,  $SD = 7.56$ , range from 12 to 75). Although most participants were at low risk (92.3%), there was a small but worrisome number of participants at medium and high risk (6.9% and 0.8%, respectively).

### **AUDIT SSAC Model**

The mediation hypotheses were assessed by examining and refining the measurement model, followed by the assessment of the full multiple mediation model, and then sequential hypothesis testing.

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<sup>6</sup> It should be noted that the ranges of scores for the AUDIT categories were adjusted to compensate for the Recruit Health Questionnaire only having eight items, but the categories were based on Study 2 results on the appropriate range of scores.

**Measurement model.** A review of the estimates, SEs, CRs, and squared correlations of the initial measurement model resulted in covarying numerous items within several scales (i.e., Negative Life Events, PTSD, and the AUDIT score), which fit the data well,  $\chi^2(945) = 39,507.96, p < .001, CFI = .91, TLI = .89,$  and  $RMSEA = .038$  (90% CI of .038 to .039). With the measurement model established, total factor scores (i.e., drawn in AMOS as observed variables; i.e., in squares) were used to test the hypotheses.

**SSAC hypothesis model.** The hypothesis model yielded a good fit with the data,  $\chi^2(1) = 1.96, p < .01, CFI = 1.00, TLI = .99,$  and  $RMSEA = .006$  (90% CI of .000 to .018), while controlling for age, sex, and marital status (Figure 3). Combined, the SSAC model explained 11.6% of variance in the AUDIT score. As predicted, the AUDIT score was negatively associated with age, and males and unmarried participants reported higher scores. For simplicity, results related to control variables are not illustrated in the model, although their associations with alcohol consumptions are provided.

**Hypothesis 1.** As expected, the positive associations between stressors and alcohol consumption were found, as higher levels of stressors were associated with higher levels of the AUDIT score, while controlling for age, sex, and marital status. The only exception was Childhood Neglect. Specifically, higher levels of Childhood Neglect were associated with lower levels of the AUDIT score (Figure 3; supporting Hypotheses 1a to 1c but not 1d).

**Hypothesis 2.** Similarly, higher levels of stressors were found to be related to higher levels of strain, while controlling for age, sex, and marital status (supporting Hypotheses 2a, 2c, and 2d). One exception was that higher levels of Exposure to Violence

were associated with lower levels of Depression. Combined, the SSAC model accounted for modest amounts of variance in Depression (8.9%) and moderate amounts in PTSD (15%).

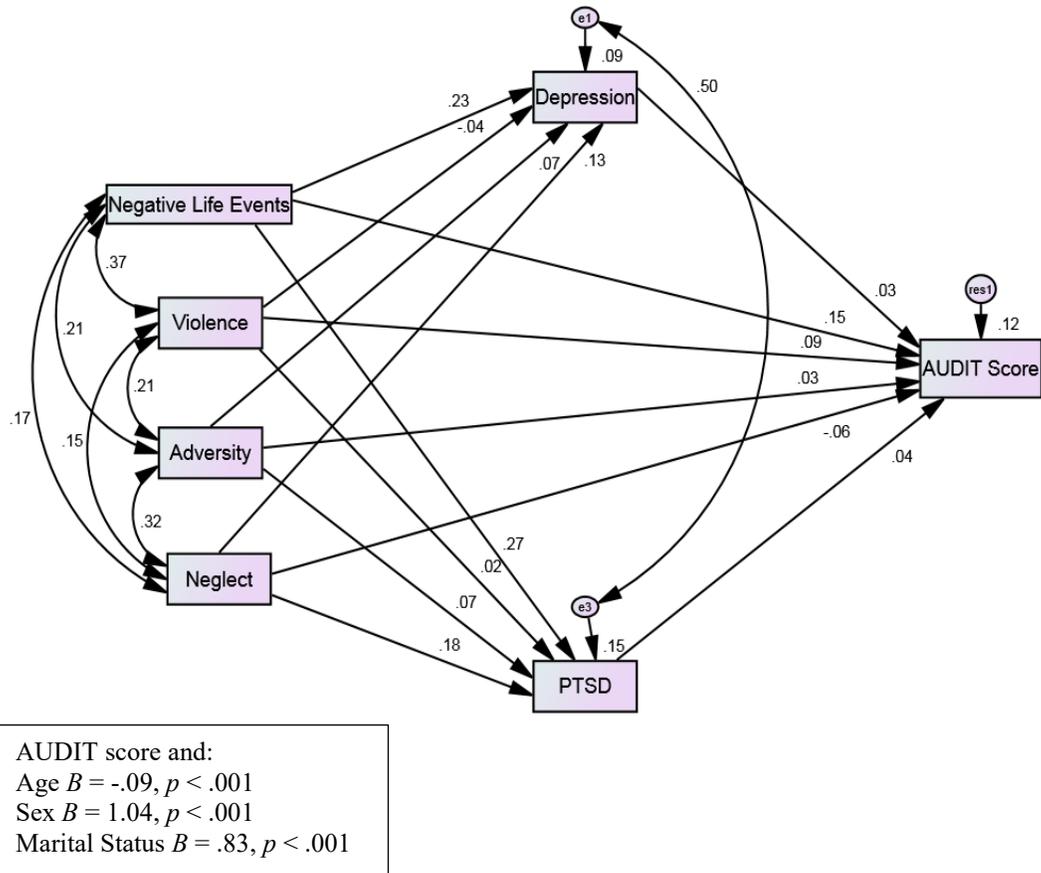


Figure 3. The SSAC model of strain mediating the relations between stressors and the AUDIT score, with standardized estimates of only significant associations and covariates shown ( $ps < .001$ ;  $N = 27,706$ ).

**Hypothesis 3.** The mediating effects of strain on the stressor/alcohol consumption association were tested using Gaskin’s test of indirect effect estimand, and each of the four stressors had significant indirect effects on the AUDIT score through strain, while controlling for age, sex, and marital status ( $ps < .002$ ; Table 5). However, the indirect effects of Exposure to Violence were not considered practically significant due to the

small size of the  $B$ s ( $B = +/- .003$ ). As such, Hypotheses 3a, 3c, and 3d were supported but not 3b.

Table 5

*Indirect Effects Stressors on the AUDIT Score through Strain*

Stressor	Estimate	BC 95% CI	
	$B$	LL	UL
	Depression		
Negative Life Events	.006**	.003	.009
Exposure to Violence	-.003***	-.005	-.002
Childhood Adversity	.006**	.003	.009
Childhood Neglect	.008**	.004	.012
Total Indirect Effects	.017		
	PTSD		
Negative Life Events	.011***	.008	.015
Exposure to Violence	.003***	.002	.005
Childhood Adversity	.011***	.008	.015
Childhood Neglect	.019***	.013	.025
Total Indirect Effects	.044		

\*  $p < .05$ . \*\*  $p < .002$ . \*\*\*  $p < .001$ .

The initial test of the SSAC model pointed to the need for a revised model reflecting significant associations that required further testing. Exposure to Violence, along with other non-significant paths (e.g., PTSD and sex; Childhood Neglect and marriage), were removed from the final mediation model,  $\chi^2(3) = 2.07$ ,  $p = .56$ , CFI = 1.00, TFI = 1.00, and RMSEA = .00 (90% CI of .00 to .009; Figure 4).

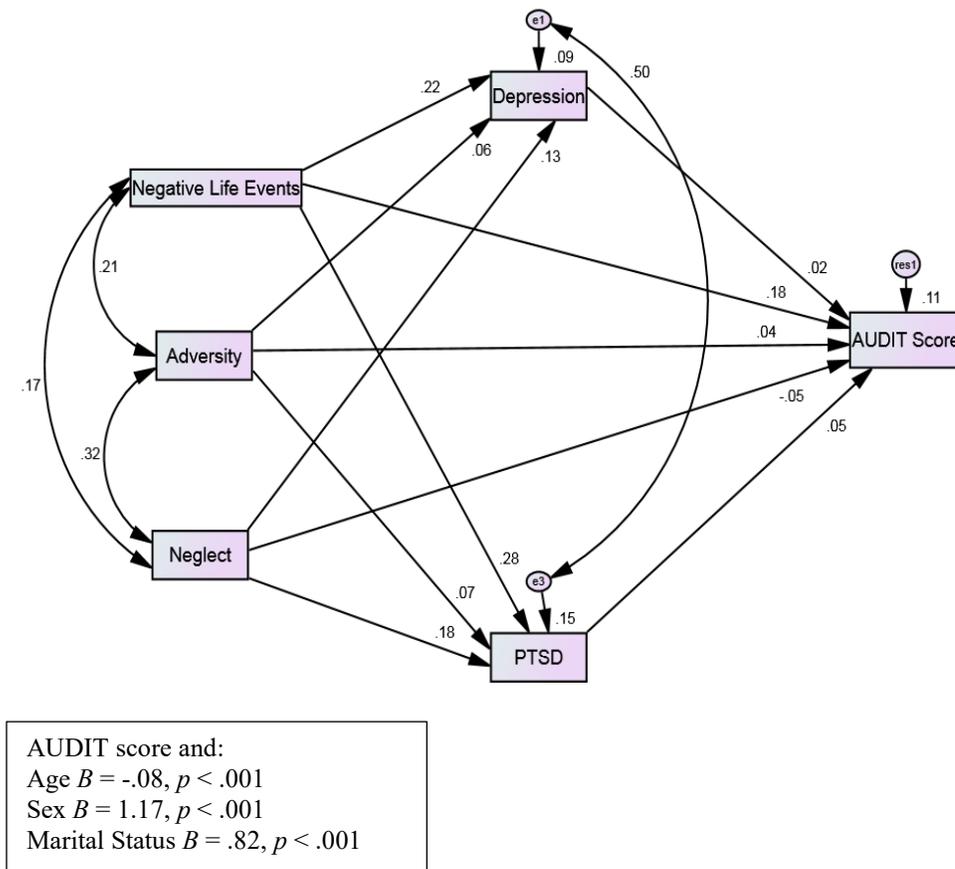


Figure 4. The revised SSAC model of strain mediating the relations between stressors and the AUDIT score, with standardized estimates of only significant associations and covariates shown ( $p_s \leq .002$ ;  $N = 27,706$ ).

### Generational differences in alcohol consumption

With insight gained into the conditions influencing alcohol consumption in the SSAC model, the influence of generation was examined. Even though participants were not distributed evenly across the generations (refer to Table 1), most differences were acceptable. However, the small number of iGens ( $n = 9$ ) warranted their exclusion from the group comparisons (e.g., rule of thumb of 100 participants per group; Zikmund, Babin, Carr, & Griffin, 2012). Underrepresentation of this generation was not surprising, as members of this generation would have only just started to enter the CAF at the last point of data collection (i.e., 2013).

**Hypothesis 4 and 5.** Due to the nature of the analysis being conducted, namely an ANCOVA, these hypotheses were assessed concurrently, first assessing generational differences in the AUDIT score.

***Generational differences in AUDIT score.*** Hypothesis 4 was supported, based on the ANCOVA results, as generation contributed significant incremental variance, over and above age, while also controlling for sex and marital status (Table 6).

Table 6

*Summary of Between-Subject Effects of Generation on the AUDIT Score*

Variable	<i>F</i>	Hypothesis df	Error df	$\eta^2$
Intercept	1,480.93***	1	27,112	.052
Sex	334.10***	1	27,112	.012
Marital Status	203.45***	1	27,112	.007
Age	76.64***	1	27,112	.003
Generation	28.13***	2	27,112	.002

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

Post-hoc pairwise comparisons supported Hypothesis 5 by revealing that, after controlling for age, sex, and marital status, Millennials ( $M = 5.50$ ,  $SE = .03$ ) reported significantly higher levels of the AUDIT score than did Gen Xers ( $M = 4.84$ ,  $SE = .05$ ) and Late Baby Boomers ( $M = 4.83$ ,  $SE = .20$ ;  $p < .001$ ). No significant differences between Gen Xers and Late Baby Boomers were found ( $p = .95$ ).

### **Exploring Generational Differences in the SSAC Model**

The comparison of the SSAC model across generations was conducted in AMOS based on the resulting model—Figure 4. A four-step process was used to identify generational differences.

**Step 1 – Model.** The model fit the data well after the addition of generational groups,  $\chi^2(9) = 20.15, p < .001$ , CFI = 1.00, TLI = .995, RMSEA = .007 (90% CI .003 to .011). The AMOS' multi-group comparison function revealed significant group differences in the model with a chi-square difference test,  $\chi^2(28) = 205.38, p < .0001$ . This result was supported by the visual inspection of Figures 5 and 6, where generational differences appeared (e.g., Childhood Neglect to PTSD differs between generations).

For Millennials, the stressor variables accounted for 8% of the variance in Depression, 14% of the variance in PTSD, and all variables combined accounted for 6% of the variance in the AUDIT score, while adjusting for the control variables. All paths were significant (Figure 5;  $ps \leq .002$ ). For this generation, age was negatively related to the AUDIT score, and participants who were males and unmarried reported higher levels.

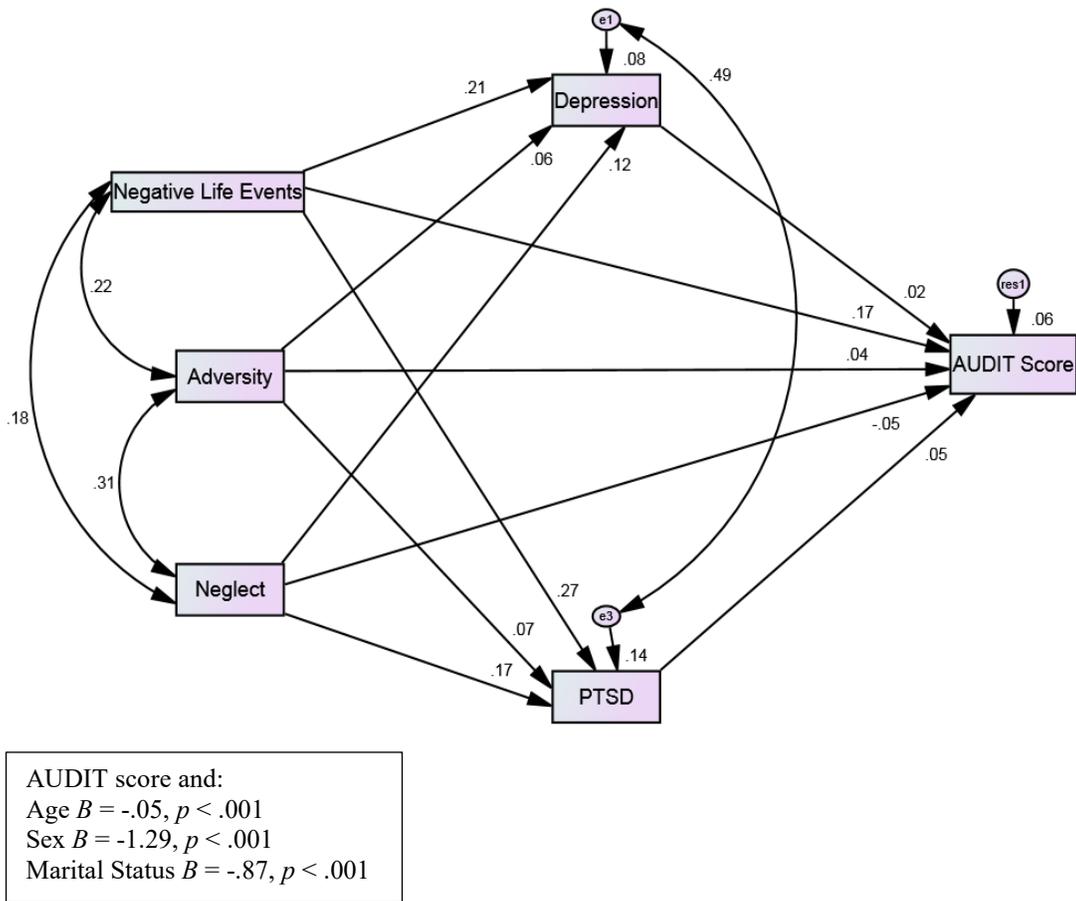
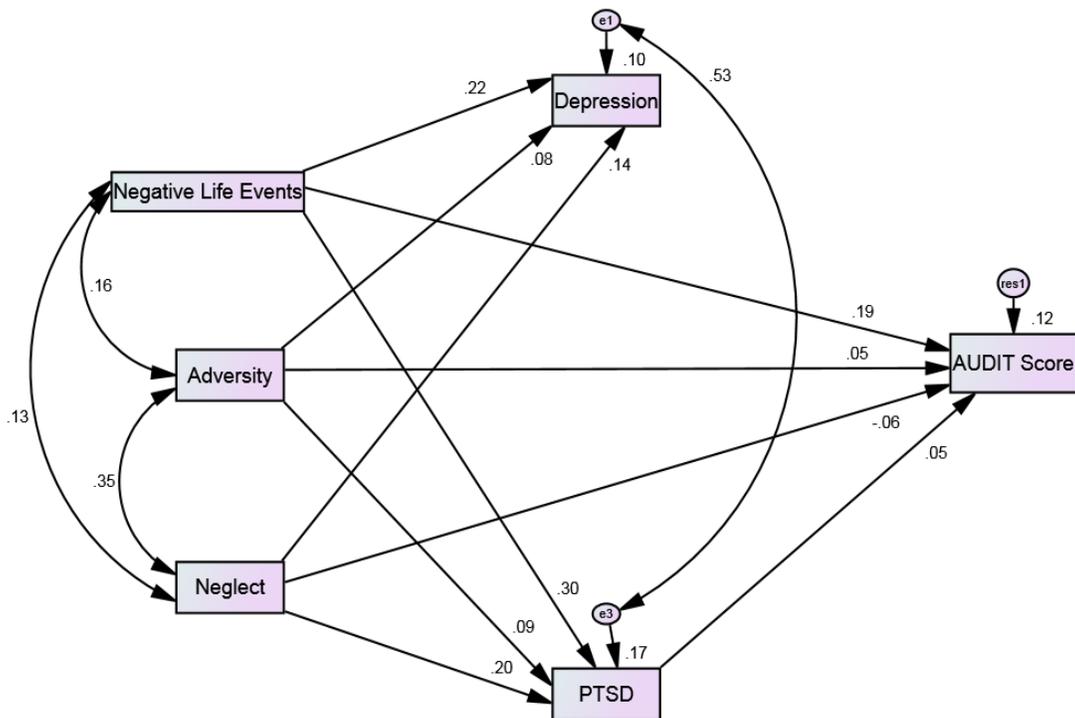


Figure 5. Millennials’ SSAC model with standardized estimates of only significant paths shown ( $ps \leq .002$ ;  $N = 21,932$ ).

For Gen Xers, all variables combined accounted 12% of the variance in the AUDIT score, and the stressor variables accounted for 10% of the variance in Depression and 17% of the variance in PTSD. All path coefficients were significant ( $ps \leq .002$ ) except for the association between Depression and the AUDIT score, which is thus absent from Figure 6. Age was negatively related to the AUDIT score for this generation, and males and unmarried participants reported higher levels.



AUDIT score and:  
 Age  $B = -.08, p < .001$   
 Sex  $B = -.90, p < .001$   
 Marital Status  $B = -.76, p < .001$

Figure 6. Gen Xers' SSAC model with standardized estimates of only significant paths shown ( $ps \leq .002$ ;  $N = 4,544$ ).

For Late Baby Boomers, stressors accounted for 13% of the variance in Depression and 18% in PTSD. Even though only Negative Life Events was significantly associated with the AUDIT score, all variables combined accounted for 10% of the variance in the AUDIT score (Figure 7). Several paths were not significant at  $p < .05$  level: the AUDIT score and each of: Childhood Adversity, Childhood Neglect, Depression, and PTSD. There were no significant differences in the AUDIT scores based on the control variables.

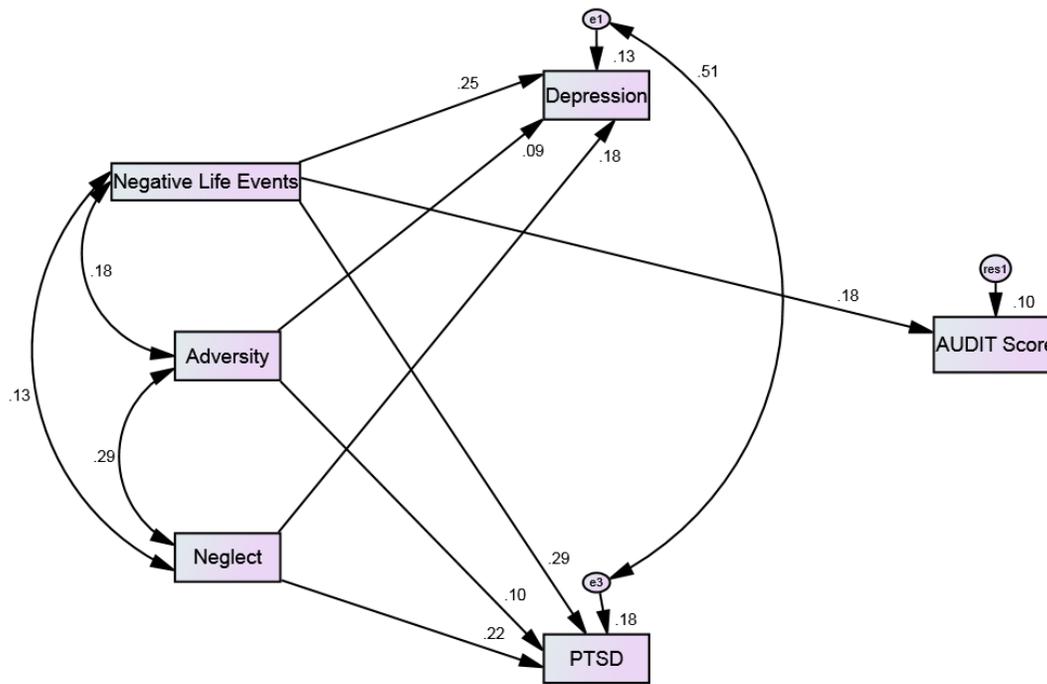


Figure 7. Late Baby Boomers' SSAC model with standardized estimates of only significant paths shown ( $p < .01$ ;  $N = 636$ ).

**Step 2 – Path identification.** Path-by-path comparisons in AMOS' multi-group function revealed that only six of the 14 paths varied significantly between the three generations: (a) two paths between Childhood Neglect and both Depression,  $\chi^2(2) = 7.39$ ,  $p < .05$ , and PTSD,  $\chi^2(2) = 10.56$ ,  $p < .01$ ; and (b) four paths between the AUDIT score and each of: Negative Life Events,  $\chi^2(2) = 7.33$ ,  $p < .05$ ; age,  $\chi^2(2) = 17.00$ ,  $p < .0001$ ; sex,  $\chi^2(2) = 16.25$ ,  $p < .0001$ ; and marital status,  $\chi^2(2) = 2.89$ ,  $p < .0001$ .

**Step 3 – Pair-wise comparisons.** In AMOS, each of the six significant paths were assessed with follow-up pair-wise comparisons to identify how the generational groups

differed by employing the multigroup analysis estimand<sup>7</sup> and using an adjusted  $p$  value of .003 (.05/[6 paths x 3 pairs = 18]). The three pairs compared sequentially were: (a) Millennials and Gen Xers, (b) Millennials and Late Baby Boomers, and (c) Gen Xers and Late Baby Boomers.

**Comparison 1.** Millennials and Gen Xers differed significantly on four of the six path comparisons. Details of the path-by-path comparisons are provided in Table 7 by the path difference estimate. Millennials had significantly lower associations between Childhood Neglect and both Depression and PTSD than did Gen Xers, as evidenced by the negative path difference estimates (i.e., -.13 and -.43, respectively). These differences are also apparent if one was to compare these paths in Figures 5 and 6. As an example, a visual comparison provides confirmation that the association of Childhood Neglect with Depression was weaker for Millennials than for Gen Xers ( $\beta = .12$  and  $\beta = .14$ , respectively), but it is the path comparison estimate that provides proof that this difference is significant. Likewise, the AUDIT score's association with Negative Life Events was also significantly weaker for Millennials than for Gen Xers. Table 7 also details differences between the two generations for the AUDIT score based on control variables. Millennials' AUDIT score/age relation was weaker than that for Gen Xers, while Millennial males and females differed significantly more on the AUDIT score ( $M = 5.33$  and  $M = 4.10$ , respectively) than did Gen Xer males and females ( $M = 4.02$  and  $M = 2.93$ , respectively). No differences were found in the AUDIT score/marital status associations between these generations.

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<sup>7</sup> Gaskin's (2016c) multigroup analysis estimand constrained each path sequentially to facilitate the pair-wise comparisons using 2,000-bootstrap samplings that provide a direct test of path differences and provided BC 90% CIs.

Table 7

*Pair-wise Path Differences between Millennials and Gen Xers*

Variable	Path Difference Estimate	BC 90% CI	
		LL	UL
Childhood Neglect			
Depression	-.13***	-.18	.09
PTSD	-.43***	-.56	-.31
AUDIT Score			
Negative Life Events	-.11***	-.14	-.08
Age	-.03	-.05	-.01
Sex	.49***	.32	.67
Marital status	.11	-.07	.29

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

**Comparison 2.** The only significant difference found between Millennials and Late Baby Boomers was the association between the AUDIT score and sex. Millennials' alcohol consumption differed based on sex, whereas no significant differences between the sexes were noted for Late Baby Boomers.

**Comparison 3.** There were no significant differences between Gen Xers and Late Baby Boomers for the six associations.

**Step 4 – Mediation differences by generation.** Lastly, the data was segregated by generations to facilitate assessing whether the mediation relations held for each generation. Individually, the model fit the data well for Millennials,  $\chi^2(3) = 11.50$ ,  $p < .01$ , CFI = 1.00, TLI = .995, RMSEA = .005 (90% CI of .005 to .019). Moreover, for Millennials, stressors had indirect effects on the AUDIT score through both Depression and PTSD ( $ps < .05$ ; Table 8).

Table 8

*Indirect Effects of Stressors on the AUDIT Score through Strain for Millennials*

Variable	<i>B</i>	BC 90% CI	
		LL	UL
Depression			
Negative Life Events	.005*	.002	.008
Childhood Adversity	.005**	.002	.009
Childhood Neglect	.008*	.003	.013
Total Indirect Effects	.018		
PTSD			
Negative Life Events	.012***	.008	.016
Childhood Adversity	.013***	.009	.019
Childhood Neglect	.021***	.014	.029
Total Indirect Effects	.046		

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

In comparison, among Gen Xers, only PTSD mediated the relations between stressors and the AUDIT score ( $ps < .001$ ; Table 9). Gen Xers' data also fit the model well,  $\chi^2(3) = 8.27$ ,  $p = .04$ , CFI = .999, TLI = .984, RMSEA = .02 (90% CI of .004 to .036). For Late Baby Boomers, although the data fit the model reasonably well,  $\chi^2(3) = .37$ ,  $p = .95$ , CFI = 1.00, TLI = 1.07, RMSEA = .00 (90% CI of .000 to .009), no stressors/AUDIT score relations were mediated by strain ( $Bs = -.008$  to  $.023$ ,  $p \geq .11$ ).

**Exploratory Question 1.** Differences between the three generations were found. There were some generational differences in the SSAC model, with Childhood Neglect being more strongly associated with strain among Gen Xers than among Millennials. The mediation effects of Depression and PTSD held for the stressor and AUDIT score relations for Millennials. However, among Gen Xers, only PTSD mediated the relations between stressors and the AUDIT score. Late Baby Boomers did not differ from either of

the other generations, and the SSAC model demonstrated limited ability to predict the AUDIT score. Rather, this score was only predicted by Negative Life Events.

Table 9

*Indirect Effects of Stressors on the AUDIT Score through Strain for Gen Xers*

Variable	<i>B</i>	BC 90% CI	
		LL	UL
Depression			
Negative Life Events	.005	-.002	.012
Childhood Adversity	.006	-.001	.014
Childhood Neglect	.003	-.001	.009
Total Indirect Effects	.014		
PTSD			
Negative Life Events	.018***	.010	.026
Childhood Adversity	.013***	.006	.022
Childhood Neglect	.018***	.010	.028
Total Indirect Effects	.049		

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

### Study 1 Discussion

The initial assessment of the SSAC model provided insight into what influenced alcohol consumption for recruits. Foremost, the pivotal concern was the degree of alcohol consumption. Despite most recruits drinking below levels of concern (i.e., 74% of participants reported drinking within normal parameters based on the AUDIT drinking patterns), 25% of participants drank at hazardous levels, while another 1.4% drank at harmful levels. Almost 30% of participants reported drinking twice a week or more, with an average of 3.68 drinks each day ( $SD = 2.57$ ; range zero to 35). Also, more than half of participants reported binge drinking frequently (e.g., monthly to more than weekly).

**SSAC model.** The SSAC model explained modest amounts of variance in the AUDIT score (12%). For members early in their military career, the negative impact of increased stressors was reflected by an association with higher scores for both strains and alcohol consumption (i.e., the AUDIT score). Hypotheses 1a, 1b, and 1c were supported, with the positive associations between all stressors and alcohol consumption, except for Childhood Neglect (Hypothesis 1d). These findings suggest that recruits use alcohol to relieve the stressors they face (Blume, 1984; Blume et al., 2010; Harris & Heft, 1992; Sayette, 1993). Contrary to expectations and counter to other stressors, higher scores in Childhood Neglect were associated with decreased alcohol consumption. Childhood Neglect has been positively related to alcohol consumption in the past (Dube et al., 2001; La Flair et al., 2013), so it is unclear why this was not the case with these recruits. This unexpected finding will be explored further later.

Hypotheses 2a, 2c, and 2d were supported as shown by the positive associations between the stressors and strains. However, the negative association between Exposure to Violence and Depression was not hypothesized (Hypothesis 2b). The former results mirror previous research showing that increases in exposure to stressors are matched by increases in strain (Pflanz, 2006; Tennant, 2002; Weisaeth, 2014). The dose-response relationship is supported by these associations, as increased exposure to previous life stressors was associated with increased levels of strain (Catani et al., 2008; Friedman et al., 2014; Wagner & Jakupcak, 2012). The stressors accounted for moderate to modest amounts of strain, with less variance having been accounted for in Depression (9%) than in PTSD (15%).

**Mediation.** Further, Hypotheses 3a, 3c, and 3d were also supported, with Negative Life Events, Childhood Adversity, and Childhood Neglect showing indirect positive effects on the AUDIT score through strain. In addition to the direct influence that Negative Life Events, Exposure to Violence, and Childhood Adversity had on increased alcohol consumption, indirect effects were found through PTSD and Depression. These findings suggest that recruits exposed to stressors tended to consume alcohol more because they were experiencing strain. Although significant, the indirect effect of Exposure to Violence on alcohol consumption through Depression was negative and therefore in contrast to the hypothesized direction (Hypothesis 3b). It was also too small to be considered practically significant. As such, Exposure to Violence was not included in the final version of the model (Figure 4). These results suggest that victims of Negative Life Events, Childhood Adversity, and Childhood Neglect increase their misuse of alcohol, at least in part, in response to the Depression and PTSD symptoms that they experience in relation to their exposure to stressors.

**Interesting/anomalous results.** Unexpectedly, among the stressors, Negative Life Events had the strongest associations with alcohol consumption and strain. This was noteworthy given the known long-term impact of Childhood Adversity and Childhood Neglect (e.g., Agorastos et al., 2014). One possible interpretation of this finding is that the stressors encountered more commonly in life (e.g., problems at work, parents divorcing, etc.) have greater direct impacts on alcohol consumption than infrequent, but substantially more traumatic experiences (e.g., violence, childhood adverse experiences). The latter have been referred to as acute stressors, as they occur infrequently, but are highly intense (Blanc & Kelloway, 2014; Hopt et al., 2011). Equally plausible is the recency effect. The

reported Negative Life Events had occurred within 12 months of the survey, whereas other stressors referred to more distant past periods: Exposure to Violence spanned one's lifetime (event *ever* happen to you) and childhood experiences were those that occurred before 17 years of age. The further back in time for retrospective questions, the more likely the memory of the event is diminished. Better memory of recent events could have strengthened participants' reactions to them and, consequently, contributed to their alcohol consumption. Alternatively, the events themselves could have influenced recent drinking habits more strongly than the other stressors.

Similarly, the mediating effects of strain varied. Specifically, the mediating effects of PTSD were stronger than those of Depression. Yet, the direct effects of PTSD and Depression on alcohol consumption were similar. This could be attributable to the more invasive nature of some PTSD symptoms (e.g., reliving traumatic events, distributed dreams, physical reactions to reminders) that may cause many sufferers of PTSD to drink to numb the pain associated with its symptoms more so than they do to alleviate the symptoms of Depression (i.e., the self-medicating hypothesis; Miller et al., 2016). Alternatively, Swendsen and Merikangas (2000) found Depression had a stronger association with alcohol dependence than with alcohol abuse, while Pietrzak and colleagues (2011) found the highest comorbidity between alcohol abuse and PTSD. Given that only alcohol consumption was examined (not alcohol dependence), the differential impacts of Depression and PTSD may have been less pronounced. This warrants further examination. Nonetheless, results generally suggest that an increase in alcohol consumption in the face of strain could be explained by the self-medicating hypothesis, with alcohol used as a coping strategy to dull the symptoms of and/or alleviate

Depression and PTSD (Epstein et al., 1998; Fergusson et al., 2009; Jacobson et al., 2001; Miller et al., 2016; Neff & Husaini, 1982; North et al., 2002; Steward, 1996; Taft et al., 2007; Uhart & Ward, 2009). Further exacerbating these interrelations is the comorbidity among Depression, PTSD, and alcohol consumption. This suggests that the dangers of strain may also be indirect, as stressors result in Depression and/or PTSD which, in turn, result in increased alcohol consumption. Simply put, strain is a dual risk factor for increased alcohol consumption.

Contrary to expectations, Childhood Neglect was negatively associated with alcohol consumption. Previous research has found this association to be repeatedly positive (Dube et al., 2002; La Flair et al., 2013). However, most research on this association has differed in that the effects of Childhood Adversity and Neglect have been examined in combination rather than separately (e.g., CAF research has tended to do the latter; Lee et al., 2016). Given that Childhood Neglect has also been associated with parental alcohol abuse and witnessing domestic abuse, it is possible that these conditions reduced the propensity for at least some of those who experienced neglect to abuse alcohol themselves (Dube et al., 2001).

In addition to the unexpected negative association between Childhood Neglect and alcohol consumption, the positive mediation effect of strain on this negative association represents an inconsistent mediation model. MacKinnon, Krull, and Lockwood (2000) described an inconsistent mediation model as one where the direct association between the independent variable and the dependent variable is an opposite sign of that found in the mediated effect (note that they also refer to this as a suppression effect in a mediation model). Simply put, the direct and indirect associations are inconsistent with one another.

The negative direct effect of Childhood Neglect on alcohol consumption changes to a positive indirect effect through strain on the AUDIT score. Childhood Neglect was only associated with increased alcohol consumption through its effect on Depression and PTSD. On the face of it, these results are intuitive given the positive association between alcohol consumption and strain (e.g., Swendsen & Merikangas, 2000). However, these findings underscore the fact that strain may be more harmful than the stressors alone. This inconsistent mediation model also highlights that there are likely multiple pathways that explain the Childhood Neglect/alcohol consumption association.

Further, Exposure to Violence also yielded unexpected results through (a) its negative associations with Depression, and (b) its the negative indirect effect on alcohol consumption through Depression. Typically, the relation between Exposure to Violence and Depression has been positive, with increases in exposure being associated with increases in Depression (Catani et al., 2008; Savarese et al., 2001; Steward, 1996; Weaver & Clum, 1995). Most individuals find violence traumatic and have difficulty coping with it, resulting in a positive association with PTSD and alcohol consumption (e.g., King et al, 1988). The mechanisms explaining these conflicting results are not clear. Perhaps for recruits with Exposure to Violence, the nature of the violence to which they were exposed did not lead to Depression but did cause symptoms of PTSD. Some individuals find alcohol does not relieve tension but rather increases it (i.e., stress dampens the alcohol use; Conger, 1956; Dvorak et al., 2018). Examples of increased anxiety from alcohol consumption include social intolerance of drinking or having “suffered a series of traumatic shocks under the conditions of inebriation” (Conger, 1956, p. 304). Alternatively, this anomalous finding might be related to weak psychometric properties,

as Lee and Hachey (2008) found low reliability and recommended caution when using this scale. Alternatively, a suppression effect of strain may have occurred on the Exposure to Violence/alcohol consumption association (MacKinnon et al., 2000). This counterintuitive finding warrants further research.

Lastly, the stressors accounted for only a modest amount of variance in Depression (9%). This is in sharp contrast to the larger amounts of variance accounted for in PTSD (15%). This could be attributed to underreporting by participants due to social desirability or to their being healthier. Indeed, participants demonstrated relatively low proportions of Depression (2.0%), but similar levels of PTSD (1.8%), compared to recruits of past studies (Depression 4.5% and PTSD 2.2%; Lee, Sumner, & Hachey, 2015). Alternatively, the very nature of Negative Life Events and Childhood Neglect may lead to PTSD, as a mental health outcome, more so than Depression because these types of stressors (e.g., being attacked, emotionally neglected, fired at, injured seriously, physically neglected, raped, robbed; Weisaeth, 2014) may be more likely to result in individuals feeling that their lives are at risk. This possibility indicates that the dose-response relationship, where increased exposure to trauma increases PTSD, was likely occurring (Catani et al., 2008; Friedman et al., 2014; Wagner & Jakupcak, 2012).

**Generational differences.** This study provides evidence, albeit of small effect size, suggesting that generation partly accounts for variations in alcohol consumption over and above age ( $\eta^2 = .002$ ). The fact that Millennials, as the youngest generation, drank more alcohol than the two older generations does support the well-established negative association of age and alcohol consumption, but it also shows that age alone does not explain all of the variation in alcohol use (Colder et al., 2010; Keeling, 2003;

Kuntsche et al., 2010; Li et al., 2007; Thomas, 2012; Twenge, 2006). Millennials, as a generation, have been found to engage in more high-risk behaviours, such as binge drinking (Alsop, 2008; Keeling, 2003; Twenge, 2006), which has been identified as a risk factor of alcohol dependence (Li et al., 2007).

However, the pattern of a younger generation drinking more than an older generation did not continue between Gen Xers and Late Baby Boomers. In fact, rather than Gen Xers drinking more than Late Baby Boomers, they drank the same amount. Because of the age differences (with age being negatively associated with alcohol consumption), one might have expected Gen Xers to consume more alcohol than Late Baby Boomers. The developmental life stage of Gen Xers (e.g., focused on starting families, having children, establishing careers) may have contributed to this generation drinking less than expected. Although Gen Xers introduced wide-scale binge drinking, they may have matured and settled down (e.g., currently 39 to 51 years of age). At this developmental stage of their lives, their focus is on family and career, albeit notably later than previous generations, indicating that they may have matured out of excessive drinking (Arnett 2000, 2007; Murphy, Blustein, Bohlig, & Platt, 2010). Alternatively, because Gen Xers experienced economic hardships when joining the workforce due to the fall of labour market, they may drink less due to financial constraints (Foot, 1996). Research has described Gen Xers as more socially oriented (e.g., greater engagement in social activism for causes, such as the AIDS epidemic) and highly-educated which, combined, might have contributed to conscious choices not to engage in alcohol consumption (Foot, 1998; Tapscott, 2009; Zemke et al., 2013). Together, these attitudes may have resulted in lower alcohol consumption among Gen Xers, compared to younger

generations, who are still focused on partying and binge drinking. Conversely, Late Baby Boomers (i.e., individuals between 52 and 65 years of age) are continuing to drink more than expected for an aging generation. This could be attributable their life phase (e.g., empty nesters, divorced, more financially secure than younger generations).

Diverging from conventional alcohol consumption/age findings, Late Baby Boomers, as the older generation, reported similar levels of alcohol consumption as Gen Xers. However, this result supports past generational research where Baby Boomers (defined as being born between 1946 and 1964): (a) had increased alcohol consumption in comparison both younger and older generations; (b) showed no decline in alcohol consumption; and (c) were found to be less likely to become abstinent, more likely to remain in higher-drinking categories, and to reduce their drinking a rate slower than other generations (Blow et al., 2002a; Levenson et al., 1998; Moore et al., 2005). Anomalous increases in alcohol consumption have also been noted at older ages (e.g., 45 years of age and older; Dawson et al., 2014; Thomas, 2012). Indeed, the fact that research on CAF veterans has found that Baby Boomers are not aging out in their use of substance abuse treatment services also supports the view that this generation is not reducing alcohol consumption (i.e., there is no decline in the need for treatment as they age; Booth & Blow, 2002).

As a generation, Late Baby Boomers faced hardships with establishing careers due to the labour market crash and scarce jobs due to large numbers of Early Baby Boomers, and this could have influenced their drinking behaviours (Foot, 1996). Further, Late Baby Boomers would have been raised in a more alcohol permissive culture (e.g., drinking at work, more driving while impaired), which may have contributed to their having similar

levels of alcohol consumption than Millennials. Notwithstanding the fact that alcohol consumption decreases with age, these results suggest that the relation between alcohol consumptions and age may be more complex and vary by generation.

***SSAC model generational differences.*** Several interesting differences were found between the three generations in the SSAC model. The Millennial generation replicated the SSAC model better than the other two generations: the three stressors contributed directly to strain and alcohol consumption, strain contributed directly to alcohol consumption, and the stressors/alcohol consumption associations were mediated by strain. Despite this, for Millennials, the SSAC model accounted for a modest amount of alcohol consumption (6%). This was smaller than that accounted for by other generations, indicating that there are additional factors influencing Millennials' alcohol consumption. For Gen Xers, only PTSD mediated the stressors/alcohol consumption associations and only PTSD predicted alcohol consumption directly. Yet, 12% of alcohol consumption was accounted for. Lastly, the model for Late Baby Boomers, which accounted for 10% of alcohol consumption, showed a different set of associations, with only a couple of direct associations being significant: Negative Life Events alone was associated with alcohol consumption, although the stressors did predict strain. Late Baby Boomers' alcohol consumption was affected by recent stressful events but not those in their distant pasts, indicating that they do not appear to react in the same manner to stressors and strain in terms of alcohol consumption compared to the two younger generations. The impact of childhood trauma could have dissipated for this generation based on the events occurring so far in the past (i.e., more recent for Millennials). Alternatively, Late Baby Boomers may have found more effective methods than alcohol consumption to deal with negative

childhood experiences and strain. Further, Late Baby Boomers who chose to embark on military careers at this later stage in life may be more resilient than younger generations who made the same choice. While any of these explanations may apply, a simpler explanation is that Late Baby Boomers experienced lower levels of stressors than the other two generations, and this was found to be the case in post-hoc analyses.<sup>8</sup>

Further, the older of the younger generations, Gen Xers, were affected more than Millennials by both previous Negative Life Events and Childhood Neglect, as evidenced by stronger associations between the former and alcohol consumption and the latter and both Depression and PTSD. This latter finding is contrary to earlier research in which generational differences in levels of depression, anxiety, and self-esteem were found, with Millennials reporting higher levels than older generations (Foot, 1996; Twenge & Campbell, 2001). Perhaps Gen Xers were exposed to more Negative Life Events or had a more established use of alcohol in response to stressors compared to Millennials. This is an area that warrants further consideration. Aside from these two path differences, both younger generations demonstrated similar stressor/strain and stressor/alcohol consumption relations, and indirect effects of stressors on alcohol consumption through PTSD.

Interestingly, the gender gap in alcohol consumption seems to have lessened for Late Baby Boomers (Dawson et al., 2015; Thomas, 2012). Yet, differences in alcohol consumption between the sexes were found for Millennials, with males consuming alcohol more than females. This could be indicating that traditional sex differences in

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<sup>8</sup> A post-hoc MANCOVA revealed generational differences in all stressors,  $F(8, 53,334) = 5.07, p < .001$ , when controlled for age, sex, and marital status. Late Baby Boomers reported significantly lower levels of Negative Life Events and higher levels of Childhood Adversity, while Millennials reported significantly higher levels of both. This might be attributable to societal changes in accepted childhood rearing practices.

alcohol consumption remain in this generation. For Late Baby Boomers, a lack of a difference in alcohol consumption might have been a function of the type of Late Baby Boomers attracted to the CAF at this later stage in life, who may be more homogeneous regarding alcohol consumption.

The initial SSAC model was revised to reflect the significant associations with all non-significant paths removed (e.g., PTSD and sex; Childhood Neglect and marriage) along with Exposure to Violence (Figure 4), thereby necessitating testing of this revised model. Results of this model not only demonstrated the mediation effects of strain on the relations between previous life stressors and alcohol consumption; they also provided a pre-deployment baseline (Time 1). However, as Study 1 was focused on examining the influence of previous life stressors, it did not address the impact of the high stress impact of the CAF work environment. As the most widely studied work stressor in military research, combat exposure has been labelled as an occupational hazard due to its negative impact on mental health and alcohol consumption. Accordingly, this revised model was re-assessed in Study 2 with combat exposure as another stressor that may influence alcohol consumption, thus providing a more rigorous assessment by controlling for baseline information.

### **Study 2—Methods**

Study 2 was conducted using CAF archival data that was collected using two separate matched surveys, namely the Enhanced Post-Deployment Screening Questionnaire and the Recruit Health Questionnaire.

**Procedure**

All members of the CAF returning from an operational deployment (i.e., post-deployment) lasting 60 days or longer are mandated to participate in the Enhanced Post-Deployment Screening process within 90 to 180 days of their return (Lee et al., 2013b). Their participation involves completing a compulsory Enhanced Post-Deployment Screening Questionnaire Booklet (Appendix D), referred to as the Enhanced Post-Deployment Screening herein. The questionnaire is followed by an interview with a health professional (e.g., social worker, counsellor) who interprets the questionnaire results. The Enhanced Post-Deployment Screening data was collected to help improve monitoring of members' physical and mental health post-deployment (Lee et al., 2013b).

At an individual level, Recruit Health Questionnaire archival data was matched to appropriate Enhanced Post-Deployment Screening archival data using an employee number, permitting a prospective design. Both the Recruit Health Questionnaire and the Enhanced Post-Deployment Screening are confidential but not anonymous surveys. This enabled a comparison of baseline indicators of previous stressors, strain, and their combined influence on alcohol consumption. Director of Access to Privacy and Information approved the linking of the two datasets at the time the data was originally merged. In addition, Carleton University's Research Ethics Board approved the use of this archival data.

**Participants**

A total of 3,319 CAF members were included in this study. Members who were deployed to Afghanistan between 2008 and 2010, returned to Canada between 2008 and 2012, and completed the Enhanced Post-Deployment Screening 90 to 180 days after their

return (data collected between 2008 and 2012) had their data matched to their Recruit Health Questionnaire data, which had been collected between 2003 and 2010.

Most participants were young ( $M = 27.01$ ,  $SD = 5.33$ ), male, and NCMs (Table 10). The average number of years of service was 4.21 ( $SD = 1.81$ ; ranged from one to 22), with 80% of the participants having served five years or less. Participants predominately served in the Canadian Army (87.9%), but a few served with the Royal Canadian Air Force (8.5%) and the Royal Canadian Navy (3.4%). This distribution was expected for an Army-centric operation, such as the mission in Afghanistan. For most participants, this was their first deployment<sup>9</sup> (68.5%). For some, it was their second deployment (19.4%), third deployment (4.2%), or their fourth deployment at the least (1.5%). In comparison to the CAF population, participants were younger (average age of CAF members is 38 years of age) and comprised of more NCMs (75% of CAF members are NCMs) and fewer females (15% of CAF members are female).<sup>10</sup> Most participants were Millennials, followed by Gen Xers, with ratios similar to Study 1. There was a small number of Late Baby Boomers, but they represented a smaller proportion than they did in Study 1. There were no iGens, but there were a small number of Early Baby Boomers. Slightly more than half of the participants had completed high school or less, while 37% had pursued post-secondary education and a minority had achieved a degree, including some NCMs ( $n = 76$ ). Most participants indicated their household income was \$59K or below, which is in line with most participants being junior NCMs (53%).

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<sup>9</sup> Deployments include domestic operations (e.g., responding to floods in Winnipeg or ice storms in Quebec) and peacekeeping operations (e.g., Bosnia).

<sup>10</sup> Data for age and rank were provided from CAF's Human Resource Management System in January 2017 and data for sex was provided from CAF's Human Resource Management System in February 2018.

Table 10

*Demographic Characteristics of Study 2 Participants*

Demographic Characteristic	Frequency	Percentage
Sex		
Males	2,972	90.6
Females	307	9.4
Rank		
NCMs	2,964	90.4
Officer cadet	315	9.6
Marital Status		
Unmarried	1,328	40.5
Married	1,914	58.4
Generation		
iGens	0	0
Millennials	2,684	81.9
Gen Xers	541	16.5
Late Baby Boomers	45	1.4
Early Baby Boomers	8	2.0
Education Level		
High school or less	1,685	51.4
More than high school but less than university	1,215	37.1
University degree	378	11.5
Household Income		
\$59K or less	1,872	57.1
\$60K to \$99K	993	30.3
\$100K or more	268	8.2
Did not know	118	3.6

**Measures**

Various scales embedded in the Enhanced Post-Deployment Screening were used to assess one stressor (combat exposure), strain (depression and PTSD),<sup>11</sup> and alcohol consumption.

**Alcohol consumption.** The 10-item AUDIT was used to measure alcohol consumption. Babor et al. (2001) have reported on the good psychometric properties of

<sup>11</sup> As anxiety was not used in Study 1, it was also not used in Study 2.

the AUDIT, with results indicating high internal consistency and high retest reliability ( $r = .86$ ). They also found it provides accurate measures of alcohol risk across gender, age, and cultures. Eight of the 10 items are scored using three 5-point Likert-type scales indicating frequency, with scales ranging from 0 (*never/none/never*) to 4 (*4 or more times a week/10 or more/daily or almost daily*). The other two items (injuries resulting from one's drinking and others expressing concern about one's drinking) are responded to using a 3-point Likert-type scale: 0 (*no*), 2 (*yes, but not in the last year*), and 4 (*yes, during the last year*). When summed, higher scores equate to higher levels of alcohol misuse. In contrast to Study 1, which only had 8 of the 10 AUDIT items, the Enhanced Post-Deployment Survey in Study 2 had all 10 of the AUDIT items. For ease of comparative purposes, the same 8 items were used for both studies (i.e., the analyses of all hypotheses in Study 2 are based on 8 items).

**Combat exposure.** A 30-item Combat Exposure Scale was used to identify combat exposure. Participants provided a yes/no (1/0) response to indicate whether they experienced each event during their most recent deployment. The total number of experiences were summed, resulting in a range of 0 to 30, with higher numbers indicating increased combat exposure. This scale was adapted from a 34-item scale developed by the Walter Reed Army Institute of Research, and has been found to be a strong predictor of mental health (Lee et al., 2013b).

**Strain.** In the Enhanced Post-Deployment Screening, the same scales are used as in the Recruit Health Questionnaire to measure depression (i.e., PHQ-9) and PTSD (i.e., PCL-C). Refer to Study 1 for more details.

### **Statistical Plan**

**Data preparation.** The same steps used in Study 1 to prepare the data were used in Study 2.

**Preliminary analyses.** Several preliminary analyses were used to assess the influence of rank (i.e., officer or NCM) and number of previous deployments on Time 2 data to determine whether they should be included as control variables. ANCOVAs were conducted in SPSS using EM imputed data to ascertain the impact of rank on the AUDIT score, while controlling for the effects of age, sex, and marital status. Regression analyses were used to identify any associations with number of previous deployments on Combat Exposure, Depression, PTSD, and the AUDIT score, while controlling for age, sex, and marital status. Three ANOVAs and one nonparametric crosstab analysis were used to determine whether to permit the control variables to covary with one another. Control variables were applied in all assessments unless otherwise indicated, and although these were assessed in each model, the paths involving the control variables are not shown in the models themselves. Instead, these results are provided separately.

In addition to descriptive statistics (i.e., the categorization of drinking patterns and strain symptoms), paired samples t-tests were used to compare Time 1 and Time 2 results. Although there were no specific hypotheses concerning differences over time on these variables, a non-parametric crosstab analysis was used to compare proportions of participants by categories of strain symptoms between Time 1 and Time 2.

Differences in alcohol consumption from Time 1 to Time 2 were also assessed with paired samples t-tests. Further, to control for age, regression was used to create an

unstandardized residual variable from which Time 1 and Time 2 could be compared a second time.

The post-deployment SSAC model was assessed in AMOS utilizing the same steps and analyses of Study 1. After the initial assessment of the post-deployment SSAC model, it was assessed again using the baseline variables (i.e., Time 1 AUDIT score, stressors and strain) by including them as covariates in the model. This was carried out to determine the influence of Combat Exposure on post-deployment alcohol consumption, while accounting for the influence of previous stressors, strain, and alcohol consumption (Cabrera et al., 2007; Hooper et al, 2008; Hypothesis 13a to 13c).

Generational differences were examined again in Study 2, post-deployment, using an ANCOVA to examine differences in alcohol consumption across the generations. Post-hoc follow-up analyses were conducted, if necessary. Next, the same four-step process used in Study 1 was applied to examine generational differences in the SSAC model to address the second exploratory question.

## **Study 2—Results**

### **Data Preparation**

After data were cleaned, anomalous entries were dealt with by either replacing responses outside of the possible range of viable responses with a missing value or removing participants when the reason for the anomaly was unknown (e.g., data entry error, data merging error). The resulting dataset included  $N = 3,279$ .

**MVA.** The missing data was examined at the scale level using MVA in SPSS to understand degrees of randomness (e.g., patterns of missing). Most scales and all demographic variables were missing a trivial amount of data (i.e., less than 5%). The four

scales with substantial amounts of data missing were examined further and no patterns illustrated potential bias with one exception: Participants who were missing data on Negative Life Events indicated that none of the Negative Life Events were relevant to them. Because the nature of this missing data was known, it caused less concern.

As such, the level of missingness was considered acceptable. Only one variable (i.e., Negative Life Events) was missing more than the suggested 10% of data (Kline, 1998). The remaining variables were missing less than 10% of data, and most were missing less than 5% of data. As there were no patterns with missing data, missing values were considered missing at random and were imputed using a combination of EM and FIML, as appropriate (Tabachnick & Fidell, 2001).

**Normality.** A small percentage of univariate outliers (< 2%) and multivariate outliers (2.1%) were retained because of the robust analyses being performed. Along with the small proportion of outliers observed, further examinations using regressions (using dummy coding for groups with/without outliers) confirmed no multi-collinearity concerns (VFI < 2.5). As well, no major deviations from a normal distribution were observed (based on residual plots). All variables were normally distributed using the criteria of 2 for skewness and 6 for kurtosis, except for Depression and PTSD, which were positively skewed and leptokurtic. Again, given the robustness of the analyses to violations of this assumption, this data was used with confidence. There was also no evidence of multi-collinearity, as the highest correlation ( $r = .62$ ) was below the recommended threshold (i.e.,  $r > .70$ ; Tabachnick & Fidell, 2001; Table 11). In addition, collinearity diagnostics provided no evidence of multi-collinearity with low VIF (< 2), both globally and within

each set of variables (i.e., stressors and strain). The descriptive statistics for all variables and correlational analyses are provided in Table 11.

### **Preliminary Analyses**

Two additional variables were of concern for influencing results, based on their positive associations with mental health problems or alcohol consumption: rank and number of previous deployments (e.g., Adler et al., 2005).

**Rank.** Four ANCOVAs were conducted utilizing Time 2 data—one each for Combat Exposure, Depression, PTSD, and the AUDIT score, controlling for age, sex, and marital status (Table 12). NCMs reported significantly higher levels on all four variables than officers, although the effect sizes were small.

**Previous deployments.** Four regressions revealed that Combat Exposure, Depression, PTSD, and the AUDIT score did not differ significantly based on number of previous deployments, after controlling for age, sex, and marital status ( $ps = .22$  to  $.69$ ).

Further, based on a series of ANOVAs, age was permitted to covary with (a) marital status: as is commonplace, unmarried participants in Study 2 were significantly younger,  $M = 27.79$ , than married participants,  $M = 31.12$ ,  $F(1, 3,241) = 76.95$ ,  $p < .001$ ,  $\eta^2 = .023$ ; (b) rank: officers were older,  $M = 30.34$ , than NCMs,  $M = 28.59$ ,  $F(1, 3,241) = 21.79$ ,  $p < .001$ ,  $\eta^2 = .023$ ; and (c) sex: males,  $M = 28.33$ , were younger than females,  $M = 30.64$ ,  $F(1, 3,241) = 65.63$ ,  $p < .001$ ,  $\eta^2 = .007$ , but this difference lessened with age (e.g., at 20 years of age females made up only 1.3% of the sample populations, whereas at 45

Table 11

*Number, Mean, Standard Deviation, and Correlations of Variables in Study 2*

Variables	1	2	3	4	5	6	7	8	9	
Enrollment										
1 AUDIT Score	–									
2 Depression	.21**	–								
3 PTSD	.22**	.58**	–							
Post-Deployment										
4 AUDIT Score	.37**	.07**	.11**	–						
5 Combat Exposure	.17**	.04*	.05**	.24**	–					
6 Depression	.06**	.20**	.20**	.30**	.19**	–				
7 PTSD	.09**	.13**	.19**	.32**	.31**	.79**	–			
Demographics Time 2										
8 Age	-.22**	-.09**	-.07**	-.22**	-.27**	-.002	-.03	–		
9 Deployments	-.03	-.03	-.02	-.04*	-.005	-.02	.01	.07**	–	
	<i>N</i>	3,036	3,191	3,126	3,275	3,278	3,269	3,272	3,278	3,065
	<i>M</i>	6.13	2.33	23.70	5.63	8.88	2.67	22.56	27.01	.34
	<i>SD</i>	3.79	3.22	8.63	3.80	6.57	3.88	8.82	5.33	.65
	<i>Range</i>	0	0	17.00	0	0	0	17.00	19	0
		29.00	23.63	77.00	28.00	29.00	25.00	82.00	55	5

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

years of age, females made up 50% of the sample population). A crosstab analysis of the proportion distributions based on sex and marriage revealed that, although the ratio of married females (52.5%) to unmarried females (47.5%) was somewhat even, the ratio of unmarried males (59.7%) to married males (40.3%) was uneven.

Based on these results, rank was added to the list of control variables that were applied to the post-deployment SSAC model (i.e., based on the results of Study 1, age, sex, and marital status), with one exception (i.e., sex was not covaried with PTSD, as this association was not significant in Study 1 or Study 2; refer to Table 12). All control variables were permitted to covary with one another.

**Descriptive results.** Post-deployment responses revealed considerable variability (e.g., standard deviations illustrated the variability in responses; Table 11). Nevertheless, differences between Time 1 (post-enrollment) and Time 2 (post-deployment) were assessed with paired sample t-tests.

***Establishing AUDIT drinking-pattern categories.*** As mentioned, only 8 of 10 AUDIT items were used to create the AUDIT score that was used in all Study 2 analyses to (a) mirror Study 1 and (b) permit a direct comparison of Time 1 and Time 2 alcohol consumption. The only exception is for preliminary analyses, where AUDIT drinking patterns were examined using the *authentic* AUDIT score based on all 10 items. The authentic 10-item AUDIT score was calculated for the sole purpose of establishing the appropriate range of scores to represent the AUDIT drinking-pattern categories: normal, hazardous, and harmful, based on 8 items. A two-step process was used.

Table 12

*Summary of ANCOVAs Examining Effects of Rank on Time 2 Variables*

Variable	<i>M</i>	<i>SE</i>	95% CI		<i>F</i>	$\eta^2$
			LL	UL		
Combat Exposure						
Intercept					168.95***	.050
Age					130.97***	.039
Sex					137.32***	.041
Marital Status					1.99	.001
Rank					20.87**	.006
NCMs	9.04	.11	8.81	9.26		
Officers	7.33	.36	6.64	8.03		
Depression						
Intercept					29.21***	.009
Age					0	.00
Sex					7.13**	.002
Marital Status					.09	.00
Rank					19.22***	.006
NCM	2.77	.07	2.63	2.91		
Officers	1.73	.23	1.29	2.17		
PTSD						
Intercept					387.80***	.11
Age					1.93	.001
Sex					1.56	.000
Marital Status					.98	.000
Rank					21.43***	.007
NCM	22.82	.16	22.50	23.14		
Officers	20.33	.51	19.33	21.33		
AUDIT Score						
Intercept					159.66***	.047
Age					60.30***	.018
Sex					40.24***	.012
Marital Status					51.23***	.016
Rank					9.06**	.003
NCM	5.70	.07	5.56	5.83		
Officers	5.03	.211	4.61	5.44		

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

First, the 10-item AUDIT scores were categorized into the three drinking patterns based on the range of scores recommended by Babor et al. (2001; Table 13). Most participants consumed alcohol at levels that caused no concerns, but almost 23% of

participants engaged in hazardous and harmful levels of alcohol consumption. This provided an indication of the number and proportion of participants within each category based on the authentic 10-item AUDIT scores and established drinking-pattern categories.

Table 13

*Participants' AUDIT Drinking Patterns Based on 10-item AUDIT Scores*

Pattern	AUDIT 10 items	Frequency	Percent
Normal	0 to 8	2,572	78.4
Hazardous	9 to 18	629	19.2
Harmful	19 or higher	78	2.4
Total	AUDIT 10 items	3,279	100.0

Second, using identical Time 2 data, the frequencies and proportions of participants in each drink-pattern category were compared between: (a) the 10-item AUDIT scores and the (b) the 8-item AUDIT scores. The 8-item AUDIT range of scores for each drinking-pattern category was adjusted until the frequencies, proportions, and individual participants mirrored that of the 10-item AUDIT scores, as much as was possible. Table 14 represents the range of scores for each category that best reflects the frequencies and proportions of participants found in the 10-item AUDIT based on the 8-item AUDIT (i.e., Column 2). This new range of scores for the 8-item-AUDIT drinking patterns best replicated the AUDIT categories based on the authentic 10-item AUDIT. As such, these ranges of scores were considered to represent the established AUDIT categories of drinking risk (Babor et al., 2001). This new range of scores was then used to

categorize participants' responses into drinking patterns for both Study 1 and Study 2 (Table 15).

Table 14

*Adjustment of AUDIT Range of Scores for Drinking Pattern Categories by Items*

Drinking Pattern Category	10-item AUDIT scores	8-item AUDIT scores
Normal	0 to 8	0 to 7
Hazardous	9 to 18	8 to 15
Harmful	19 or higher	16 or higher

**Descriptive results and Time 1/Time 2 comparisons.** Post-deployment responses revealed considerable variability (e.g., standard deviations illustrated the variability in responses; Table 11). The distribution of participants over the categories for alcohol consumption, the stressor, and strain are provided, along with a comparison of Time 1 (post-enrollment) and Time 2 (post-deployment), which were assessed with paired sample t-tests.

**Alcohol consumption.** Results for both Time 1 and Time 2 are provided in Table 15. Paired samples t-tests indicated that the proportion of participants who engaged in hazardous drinking reduced between Time 1 and Time 2, while the proportion of those who reported normal and harmful drinking increased.

Table 15

*Distribution of Participants' AUDIT Drinking Patterns Based on 8 AUDIT Items*

Pattern	Time 1		Time 2	
	Frequency	Percent	Frequency	Percent
Normal	2,246	68.4	2,443	74.5
Hazardous	977	29.8	756	23.1
Harmful	59	1.8	80	2.4
Total	3,279	100.0	3,279	100.0

*Note.* The ranges of scores for the AUDIT categories were adjusted to account for the Recruit Health Questionnaire only having eight AUDIT items.

**Stressors.** Participants experienced, on average, approximately nine different types of combat events over the course of their most recent deployment ( $M = 8.88$ ,  $SD = 6.57$ ). While only a small minority of participants escaped without being exposed to any combat ( $n = 286$ ; 8.7%), the remainder witnessed numerous combat events, while others were exposed to a high number of combat events ( $\geq 20$ ;  $n = 204$ ; 7.3%). The most frequently reported combat events were being exposed to hostile civilians, an improvised explosive device explosion, and incoming artillery/rocket/mortar fire (Table 16).

Table 16

*Prevalence of Combat Experiences among Participants*

Order	Combat Experience	Percent
1	Hostile civilians	67.2
2	Improvised explosive device (IED) explosion	63.6
3	Receiving incoming artillery/rocket/mortar fire	58.1
4	Working in areas with mines/IEDs	51.4
5	Attacked/ambushed	50.1

6	Receiving small arms fire	49.9
7	Seeing bodies/remains	48.8
8	Seeing accident	45.0
9	Member of own unit become a casualty	42.6
10	Clearing/searching homes or buildings	42.6
11	IED/mine clearing	41.5
12	Seeing dead or seriously injured Canadians	40.0
13	Shooting or directing fire at the enemy	36.9
14	Knowing someone seriously injured or killed	35.1
15	Being in threatening situations where you were unable to respond due to rules of engagement	28.1
16	Seeing ill/injured women and children who you were unable to help	28.0
17	Difficulty identifying combatants	24.0
18	Handling bodies/remains	20.6
19	Clearing/searching caves or bunkers	17.1
20	Seeing unit member blown-up	14.9
21	Calling in fire on the enemy	14.5
22	Buddy hit nearby	14.4
23	Close call	12.3
24	Feeling directly responsible for the death of an enemy combatant	10.3
25	Witnessing friendly fire	8.9
26	Being wounded/injured	8.1
27	Sniper fire	7.8
28	Feeling responsible for the death of a Canadian or ally personally	2.4
29	Feeling directly responsible for non-combatant death	1.6
30	Engaging in hand-to-hand combat	1.0

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**Strain.** A low, but considerable number of participants reported moderate to severe levels of Depression at Time 2 (20%; Table 17). In comparison to Time 1 ( $M = 2.35$ ,  $SD = 3.18$ ), an increase in Depression was found at Time 2 ( $M = 2.68$ ,  $SD = 3.91$ ),  $t(3,278) = -4.17$ ,  $p < .001$ . Furthermore, the proportion of participants in the categories of concern increased between Time 1 and Time 2. A low proportion of participants would have met the threshold for probable diagnosis of the depression disorder 2.8% ( $n = 91$ ) at Time 2.

Table 17

*Distribution of Participants' Depression Levels at Time 1 and Time 2*

Level	Time 1		Time 2	
	Frequency	Percent	Frequency	Percent
Mild	2,734	83.4	2,603	79.4
Moderate	415	12.7	456	13.9
Moderately Severe	91	2.8	141	4.3
Severe	39	1.2	79	2.4
Total	3,279	100	3,279	100

The average PTSD score was approximately 23, indicating low risk. This was confirmed when looking at distributions across risk categories. Nonetheless, there was a substantial number of participants at medium and high risks, which represented lower proportions at Time 2 than Time 1 (Table 18). In comparison to Time 1 levels of PTSD ( $M = 23.78$ ,  $SD = 8.49$ ), a decrease in PTSD was found at Time 2 ( $M = 22.58$ ,  $SD = 8.86$ ),  $t(3,278) = -6.18$ ,  $p < .001$ . Furthermore, the proportion of participants in the medium risk

category decreased between Time 1 and Time 2, while no change was noted in the proportion of participants in the high-risk category. At Time 1, a low proportion of participants would have reported symptoms to meet the threshold for a probable diagnosis of PTSD 2.2% ( $n = 71$ ).

Table 18

*Distribution of Participants' PTSD Levels at Time 1 and Time 2*

Risk Category	Range of Scores	Time 1		Time 2	
		Frequency	Percent	Frequency	Percent
Low risk	< 34	2,925	89.2	2,973	90.7
Medium Risk	$\geq 34$ and < 50	277	8.4	277	6.9
High Risk	$\geq 50$	77	2.3	79	2.4
Total		3,279	100	3,279	100

Crosstabs were used to examine changes between the three risk levels of PTSD. An association was found,  $\chi^2(4) = 59.38, p < .001$ , whereby, as a rule, most participants who reported low-risk PTSD at Time 1 also reported low risk at Time 2 (92%). However, the same was not true for participants who reported medium-risk (82%) or high-risk symptoms (74%) at Time 1 and then low risk at Time 2 (i.e., a decrease in PTSD symptoms). Conversely, smaller percentages of low risk participants at Time 1 reported medium risk (6%) and high risk (2.2%) at Time 2 (i.e., an increase in PTSD symptoms).

**Alcohol Differences across Time**

**Hypothesis 6.** The contention that alcohol consumption would increase between pre-enrollment and post-deployment (i.e., between Time 1 and Time 2) was not

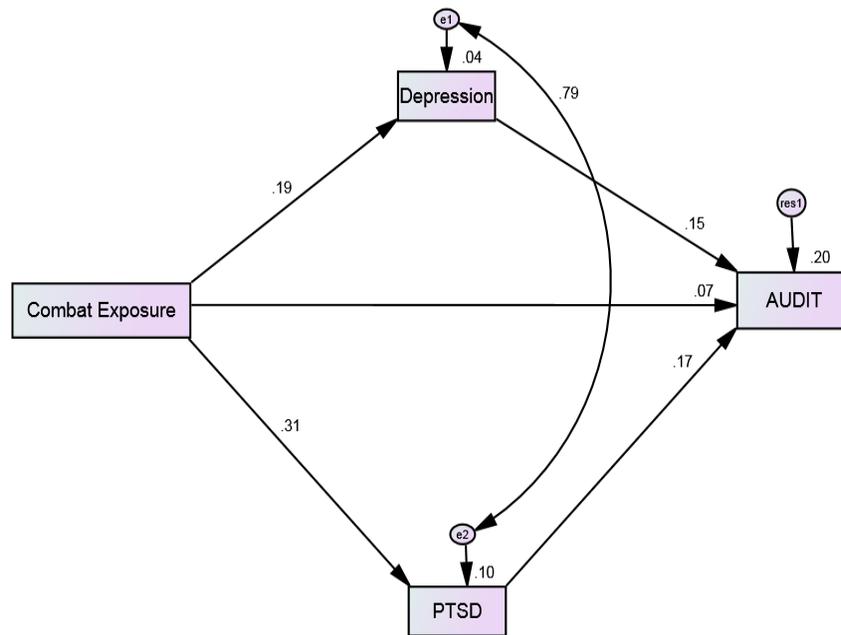
supported, as there were no significant differences between Time 1 ( $M = 5.77$ ,  $SD = 3.71$ ) and Time 2 ( $M = 5.66$ ,  $SD = 4.14$ ) for the AUDIT score,  $t(3,241) = 1.42$ ,  $p = .16$ .

### **Post-Deployment SSAC Model**

The post-deployment SSAC model with Combat Exposure fit the data well,  $\chi^2(1) = 28.37$ ,  $p < .001$ , CFI = .995, TLI = .860, and RMSEA = .092 (90% CI of .065 to .122; Figure 8), while controlling for age, sex, marital status, and rank. Moderate amounts of variance were accounted for in the AUDIT score (20%), which was negatively associated with age. Male and unmarried participants reported higher levels than did their female and married counterparts, but no differences were noted between ranks.

**Hypothesis 7.** As hypothesized, higher levels of Combat Exposure were associated with higher levels of the AUDIT score, while controlling for age, sex, marital status, and rank (Figure 8). Strain was also positively related to the AUDIT score.

**Hypothesis 8.** Similarly, increases in Combat Exposure were associated with increases in both Depression and PTSD, while adjusting for the control variables. All variables combined accounted for modest amounts of variance in PTSD (9.6%) and Depression (3.8%).



AUDIT score and:  
 Age  $B = -0.09, p < .001$   
 Sex  $B = 1.39, p < .001$   
 Marital Status  $B = 1.01, p < .001$

*Figure 8.* The post-deployment SSAC model of strain mediating the Combat Exposure and AUDIT score relation with standardized estimates of only significant paths shown ( $ps < .001$ ;  $N = 3,241$ ).

**Hypothesis 9.** Similar to Study 1, Depression and PTSD significantly mediated the association between the stressor—Combat Exposure—and the AUDIT score (i.e.,  $ps < .001$ ; Table 19) using Gaskin’s test of indirect effects estimand.

Table 19

*Indirect Effect of Combat Exposure on the AUDIT Score through Strain*

Variable	<i>B</i>	BC 95% CI	
		LL	UL
Depression			
Combat Exposure	.017***	.011	.025
PTSD			
Combat Exposure	.031***	.019	.044
Total Indirect Effects	.048		

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

**Post-Deployment SSAC model with Time 1 Covariates**

A more constrained test of the post-deployment SSAC model was assessed with the addition of Time 1 stressors, strain, and the AUDIT score. This model also fit the data well (Table 20). Within the model, all control variables were permitted to covary with one another, where appropriate, as aligned with Study 1 results. The differences between the two models were significant.

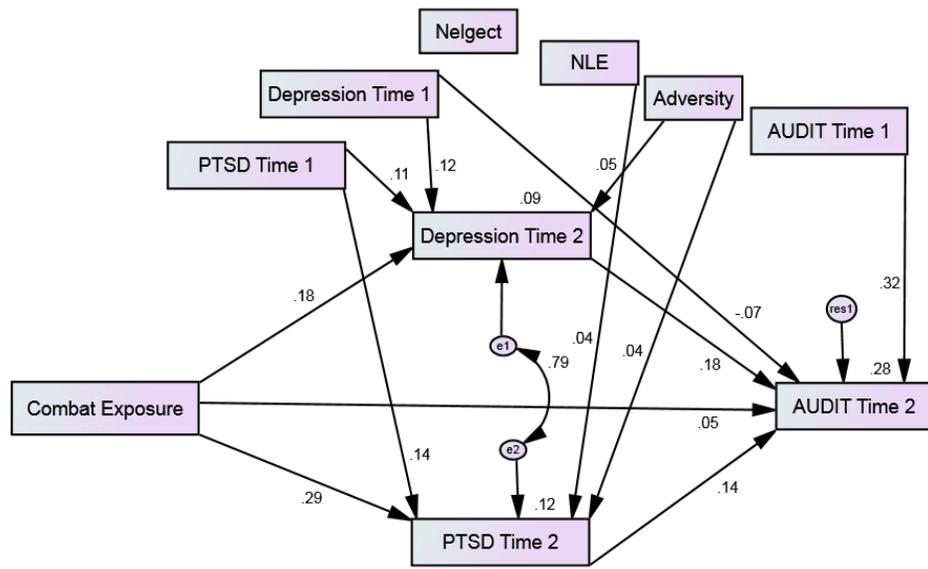
Table 20

<i>Model Fit Comparison between Post-Deployment Model without/with Time 1 Covariates</i>								
Version	$\chi^2$	df	$\chi^2$	CFI	TFI	RMSEA	90% CI	
							LL	UL
Study 2	5		38.34***	.994	.966	.045	.033	.059
Study 2-T1	13		139.16****	.986	.901	.055	.047	.064
$\Delta\chi^2$	8		100.82****					

*Note.* T1 = with Time 1 constraints. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . \*\*\*\*  $p < .0001$ .

**Hypotheses 10.** Several, but not all, expectations were met regarding the influence of baseline measures in the post-deployment SSAC model. Time 1 stressors had limited influence on Time 2 variables: (a) Negative Life Events were positively related to Time 2 PTSD; (b) Childhood Adversity was positively related to Time 2 Depression and Time 2 PTSD (partial support for Hypothesis 10a); (c) for strain, Time 1 Depression was positively related to Time 2 Depression and Time 2 AUDIT score; (d) Time 1 PTSD was positively associated with Time 2 PTSD, as well as Time 2 Depression (partial support for Hypothesis 10b; and (e) lastly, the AUDIT score at Time 1 only predicted the AUDIT score at Time 2 (partial support for Hypothesis 10c). Combined, these results partially support Hypothesis 10 that Time 1 stressors, strain, and alcohol consumption would influence Time 2 variables.

With the addition of covariates from Time 1, the amounts of variance accounted for increased in the AUDIT score Time 2 (from 20% to 27.6%), in PTSD Time 2 (from 9.6% to 12.3%), and in Depression Time 2 (from 3.8% to 8.7%).



AUDIT score and:  
 Age  $B = -0.05, p < .001$   
 Sex  $B = 0.93, p < .001$   
 Marital Status  $B = 0.97, p < .001$

Figure 9. The post-deployment SSAC model with Time 1 covariates (covariances among Time 1 variables and control variables not shown) with standardized estimates of only significant paths shown (i.e., rank not significant so not shown;  $ps < .001$ ;  $N = 3,157$ ).

**Mediation.** Even with Time 1 stressors, strain, AUDIT score, and control variables as covariates, Depression and PTSD significantly mediated the Combat Exposure/AUDIT score relation at Time 2 using Gaskin’s indirect effect test estimand ( $ps < .001$ ; Table 21).

Table 21

*Indirect Effect of Combat Exposure on the AUDIT Score through Strain while Covarying Time 1 Stressors, Strain, and AUDIT Score*

Variable	<i>B</i>	BC 95% CI	
		LL	UL
Depression			
Combat Exposure	.018***	.012	.025
PTSD			
Combat Exposure	.024***	.013	.036
Total Indirect Effects	.042		

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

### **Generational Differences in Post-Deployment Alcohol Consumption**

The majority of participants were, not surprisingly, Millennials (Table 10). There were no iGens in this study and, unfortunately, too few Early and Late Baby Boomers to retain for comparisons, negating the ability to assess Hypotheses 12b and 12c.

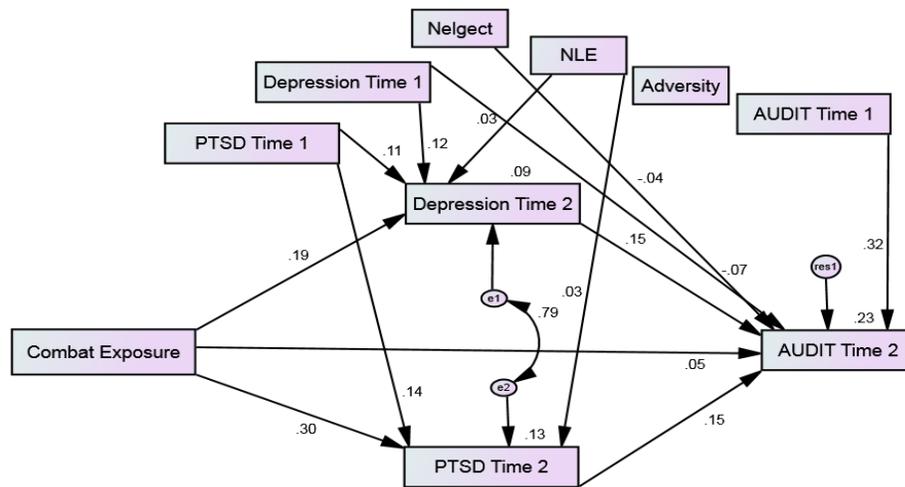
**Hypotheses 11 and 12.** As generation failed to explain additional variance over and above age, after controlling for age, sex, and marital status in an ANCOVA,  $F(1, 3,183) = 1.08, p = .30$ , no differences were found between generations. These results supported neither Hypothesis 11 nor 12.

### **Exploring Generational Differences in the Post-Deployment SSAC Model**

The original intention was to repeat the four-step process used in Study 1 to examine generational differences in the SSAC model for Study 2, but the reduction to only two generations negated Step 3; namely, conducting pair-wise comparisons to ascertain on which paths the generations differed. Accordingly, only three steps were

used. With the addition of generational groups, the model fit the data well,  $\chi^2(26) = 125.25, p < .001, CFI = .988, TLI = .919, RMSEA = .035$  (90% CI .029 to .041).

**Step 1 – Model.** Using AMOS’ group difference analysis, the initial step in comparing the overall model between generations indicated significant group differences,  $\chi^2(27) = 61.97, p < .001$ . Visually, differences between the generations were noted (Figures 10 and 11). For Millennials, combined, all variables accounted for 25.6% of the variance in the AUDIT score, 11.8% of the variance in PTSD, and 8.5% of the variance in Depression, after controlling for Time 1 stressors, strain, and AUDIT score (Figure 10). Younger Millennials had higher AUDIT scores, as did male and unmarried Millennials, but rank was not a significant covariate.

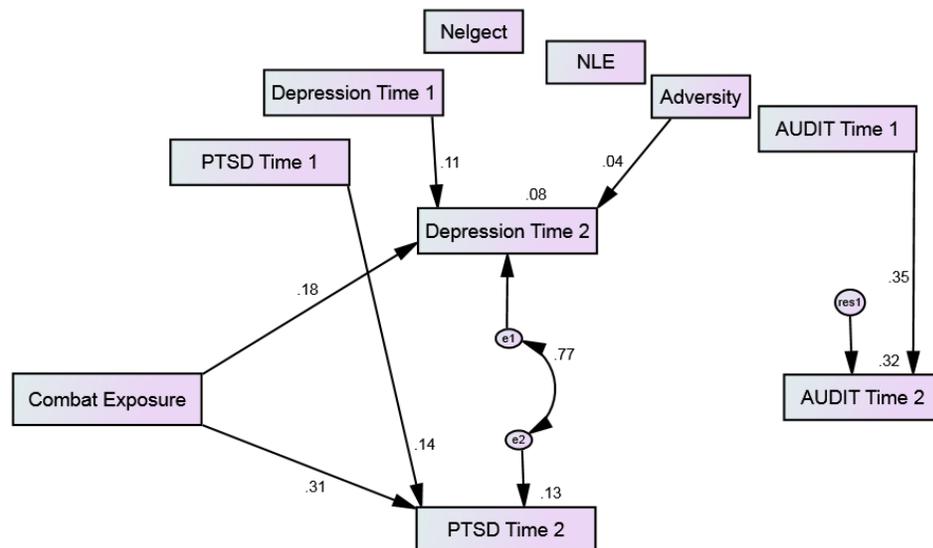


AUDIT score and:  
 Age  $B = -.08, p < .001$   
 Sex  $B = 1.15, p < .001$   
 Marital Status  $B = 1.03 p < .001$

Figure 10. Millennials’ post-deployment SSAC model with Time 1 covariates (covariances among Time 1 variables not shown) with standardized estimates of only

significant associations shown (i.e., rank not significant so not shown;  $ps < .001$ ;  $N = 2,654$ ).

Substantial amounts of variance in the AUDIT score were accounted for among Gen Xers (31.5%), as well as moderate amounts in PTSD (13.2%) and modest amounts in Depression (7.8%). Nonetheless, few associations were significant for Gen Xers: (a) the AUDIT score at Time 1 was only related to the AUDIT score at Time 2; (b) Combat Exposure was related to both Depression and PTSD at Time 2; (c) Depression and Childhood Adversity at Time 1 were related to Depression Time 2; and (d) PTSD at Time 1 was related to only PTSD at Time 2 (Figure 11). For Gen Xers, differences in the AUDIT score were only found with higher scores for those who were unmarried (i.e., no age, sex, and rank differences were found).



AUDIT score and:  
Marital Status  $B = .50, p < .05$

Figure 11. Gen Xers' post-deployment SSAC model with Time 1 covariates (covariances among Time 1 variables not shown) with standardized estimates of only significant

associations shown ( $ps < .001$ ; i.e., age, sex, and rank not significant so not shown;  $ps > .05$ ;  $N = 535$ ).

**Step 2 – Path identification.** Six path-by-path comparisons were conducted in AMOS' multi-group function to identify which associations differed between the two generations using a chi-square difference test and constraining each path for comparison. Only one path differed significantly: Millennials had weaker associations between the AUDIT score at Time 1 and Time 2 ( $\beta = .32$ ) than did Gen Xers ( $\beta = .35$ ),  $\chi^2(1) = 5.41$ ,  $p < .05$ .

**Step 3 – Mediation differences by generation.** Next, creating separate databases for each generation permitted the assessment of whether mediation relations held for each generation. The starting point was the SSAC model constrained by Time 1 stressors, strain, and the AUDIT score. For Millennials, the model fit the data well,  $\chi^2(13) = 84.42$ ,  $p < .0001$ , CFI = .990, TLI = .930, and RMSEA = .046 (90% CI of .037 to .055), and strain significantly mediated the Combat Exposure and AUDIT score relations using Gaskin's indirect effect test estimand ( $ps < .001$ ; Table 22).

Table 22

*Indirect Effect of Combat Exposure on the AUDIT Score through Strain for Millennials*

Variable	B	BC 95% CI	
		LL	UL
	Depression		
Combat Exposure	.020***	.013	.028
	PTSD		
Combat Exposure	.027***	.016	.040
Total Indirect Effects	.047		

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

For Gen Xers, the data fit the model reasonably well,  $\chi^2(13) = 40.79, p < .0001$ , CFI = .981, TLI = .868, and RMSEA = .063 (90% CI of .042 to .086). However, strain failed to significantly mediate the stressor and AUDIT score relations ( $ps \geq .25$ ; Table 23).

Table 23

*Indirect Effect of Combat Exposure on the AUDIT Score through Strain for Gen Xers*

Variable	B	BC 95% CI	
		LL	UL
	Depression		
Combat Exposure	.009	-.004	.027
	PTSD		
Combat Exposure	.020	-.009	.062
Total Indirect Effects	.029		

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

**Exploratory question 2.** Study 2 was limited to exploring differences between only two generations. Nonetheless, differences in the overall models for each generation were apparent, with Millennials retaining the post-deployment SSAC model with all associations being significant. Most importantly, strain continued to mediate the associations between Combat Exposure and the AUDIT score, while controlling for Time 1 variables and control variables. In contrast, Gen Xers did not retain the post-deployment SSAC model, having significant associations only between Combat Exposure and strain, and between Time 1 variables and their Time 2 counterparts (i.e., Depression Time 1 and Time 2, PTSD Time 1 and Time 2, and the AUDIT score Time 1 and Time 2). As neither the stressor, nor the strain had significant paths to the AUDIT score, mediation by strain

was not expected. In short, the generational differences continued in the post-deployment SSAC model.

## **Study 2 Discussion**

The post-deployment SSAC model explained a moderate amount of variance in alcohol consumption and more so than the previous SSAC model. Following an operational tour in Afghanistan, CAF members reported being exposed to approximately nine different types of combat experiences, on average, with most participants reporting that they had been exposed to numerous combat events (e.g., 70% of participants were exposed to  $\geq 5$  combat events). However, as many events may have occurred at the same time (e.g., witnessing injuries and death after experiencing an IED explosion) or over the course of this deployment or multiple deployments, without asking participants the frequency of occurrence over time, an accurate picture of how many combat experiences in total is difficult to obtain from this data (Castro & Adler, 2011). The types of combat that participants were exposed to appeared comparable to that found in other studies, such as Bliese et al. (2017). By way of an example, 49% of CAF members in the current study reported seeing dead bodies and human remains, and 40% reported seeing dead or seriously injured Canadians, in comparison to 36% of U.S. veterans who reported exposure to the dead, dying, and wounded (Norris & Slone, 2014).

With these reports of Combat Exposure, support for Hypothesis 7, that the increases in Combat Exposures were related to increases in alcohol consumption, was not surprising. Support for Hypothesis 8, that increases in strain would also be associated with increases alcohol consumption, was also expected. Both findings align with previous research and highlight the importance of understanding the influence of Combat Exposure

on deployed members' mental health (Bouchard, Baus, Bernier, & McCreary, 2010; Fear et al., 2010; Fetzner et al., 2013; Jacobson et al., 2008; McCuaig Edge & Ivey, 2012; Ramchand et al., 2011; Saxon et al., 2001; Skomorovsky & Lee, 2012; Wilk et al., 2010).

**Strain.** The influence of strain expectedly provided further explanation on how Combat Exposure affects alcohol consumption. Hypothesis 9 was supported, as strain mediated the association between Combat Exposure and the AUDIT score. Military members exposed to combat tended to consume alcohol more because they were experiencing PTSD. Thus, when military members exposed to high levels of Combat Exposure were experiencing Depression and PTSD symptoms, greater alcohol consumption was observed. This supports previous results where PTSD was found to mediate the positive relations between Combat Exposure and alcohol consumption in Canadian soldiers who served in Afghanistan (Watkins, Silins, & Zamorski, 2015).

In this study, the Combat Exposure/PTSD association was stronger than the Combat Exposure/Depression association. This result supports other research on CAF members, where it was found that Depression was less prevalent than PTSD post-deployment (Boulos & Zamaroski, 2013). Further, PTSD was once found to have been the only psychological disorder significantly associated with Combat Exposure for CAF members (Sareen et al., 2008). On the flip side, PTSD has been attributed to Combat Exposure more frequently than other traumatic events (Gilbertson et al., 2010; Goodwin & Rona, 2013). It could be that participants used coping strategies other than alcohol use in response to Depression. In contrast, because PTSD tends to be more invasive, they may have been more prone to employing avoidant-coping strategies in response to it, resulting

in self-medication with alcohol. In addition, the indirect impact of Combat Exposure on alcohol consumption was better explained through PTSD than through Depression.

**Alcohol consumption.** Despite the support for the post-deployment SSAC model, the anticipated post-deployment changes in alcohol consumption were not found. Accordingly, Hypothesis 6 was not supported.

When looking at the AUDIT drinking patterns, the proportion of participants who reported harmful drinking behaviours increased slightly, while those reporting normal drinking patterns increased, and those reporting hazardous drinking decreased. While this is good news for most, it is not good news for military members who increased their drinking to harmful levels, putting them at greater risks for alcohol dependency and problems. Nonetheless, the hypothesized associations between alcohol consumption and stress/strain were found.

**Post-deployment SSAC model with Time 1 covariates.** Numerous findings were expected with the addition of Time 1 stressors, strain, and alcohol consumption as covariates: The post-deployment SSAC model with Time 1 covariates: (a) demonstrated an acceptable fit with the data, but not better than the non-constrained model; (b) retained the same relations, including strain mediating the stressor/alcohol relations; (c) explained more variance in strain and alcohol consumption; and (d) illustrated that some stressors and strains from Time 1 continued to influence strain at Time 2 (Figure 9). As expected, alcohol consumption and strain were each significantly associated with their Time 2 counterparts and, as such, Hypotheses 10a-10c had partial support.

PTSD at Time 1 was positively related to Depression at Time 2, and Depression at Time 1 was negatively related to alcohol consumption at Time 2. This supports past

research about the high degree of comorbidity among these three mental health issues (Basile et al., 2004; Kessler et al., 1995; Rona et al., 2009). Negative Life Events and Childhood Adversity were positively related to PTSD at Time 2, which highlights the importance of being aware of a life-span of cumulative trauma. This association may be related to new traumatic events (i.e., combat) that may reactivate the trauma associated with previous stressors, especially Childhood Adversity (Iversen et al., 2008). Previously, increases in traumatic events for CAF members have been positively associated with Depression and PTSD (Nelson et al., 2011). While many studies have assessed the impact of Childhood Adversity on military members' mental health (e.g., Depression and PTSD) and found a positive association (Agorastos et al., 2014; Cabrera et al., 2007; Clarke-Walper et al., 2013; Iversen et al., 2008), few studies have assessed its influence longitudinally. This result provides confirmatory evidence of the long-lasting influence of Childhood Adversity on Depression and PTSD post-deployment, which may cumulatively affect one's reaction to stress at a later point (Hammen, 2005). The same was found to be true regarding the cumulative effects of day-to-day and major life stressors. Accordingly, prior negative experiences have been found to impact PTSD (Brewin, Andrews, & Valentine, 2000; Hammen, 2005). As well, some Negative Life Events may have resulted in chronic stress (e.g., rape, miscarriage, abortion, a partner being raped) or continuous stress (e.g., marital/relationship discord), which may have contributed to increased strain in the longer term (Hammen, 2015).

Unexpectedly, Childhood Neglect failed to have any influence at Time 2. This was attributed not to a lack of long-term negative impact, but rather to the fact that its impacts may be less pronounced when other stressors and strains are considered. A

plausible explanation is that some people join the military because they are seeking comradeship which, when found (e.g., from military comrades or a partner/spouse), provided the support necessary to mitigate the influence of Childhood Neglect. While Depression at Time 1 continued to influence Depression at Time 2, it also negatively impacted alcohol consumption post-deployment. This latter finding could be attributed to treatment that participants who had Depression at Time 1 received, as this would have had a dampening effect on alcohol consumption (e.g., medication). This finding lends its support to neither the argument that Depression leads to alcohol consumption, nor to the argument that alcohol consumption leads to Depression (Fergusson et al., 2009). This finding could be attributable to the increase in Depression reported between Time 1 and Time 2.

**Generational differences post-deployment.** Regrettably, only two generations were sufficiently represented to permit comparisons: Millennials and Gen Xers. This limits the scope of the results to provide insight across multiple generations. Generation did not predict alcohol consumption over and above age; thereby, failing to support Hypotheses 11 and 12. This lack of result could indicate that generation does not predict incrementally above age in a post-deployment context or it may be attributable to unequal group sizes across both groups. Nonetheless, significant differences between generations were found in the post-deployment SSAC model.

The post-deployment model only held for Millennials among whom all stressor/strain and stressor/alcohol consumption associations were found and among whom strain mediated the stressor/alcohol consumption relations. These results support previous research, where a significant interaction effect of PTSD on the association

between Combat Exposure and alcohol consumption was found to be stronger for younger military members (Watkins, Silins, & Zamorski, 2015). Of note, for Millennials, Childhood Neglect, Depression, and alcohol consumption at Time 1 were associated with alcohol consumption at Time 2.

For Gen Xers, the post-deployment SSAC model with Time 1 covariates did not hold together well. This is likely attributable to the small sample relative to that of Millennials. For this generation, Combat Exposure was not positively related to alcohol consumption, either directly nor indirectly. A post-hoc analysis revealed that Millennials experienced a higher number of combat experiences ( $M = 9.56$ ,  $SD = 6.54$ ) than did Gen Xers ( $M = 5.99$ ,  $SD = 5.82$ ),  $F(3, 3, 274) = 57.55$ ,  $p < .001$ . This result is not surprising given the hierarchy of the CAF, where the largest proportions of members, especially combat arms members (e.g., infantryman, artilleryman, etc.; those who would be on the front line and behind enemy lines) are lower-ranked, younger members. It appears Gen Xers' combat experiences manifested into strain symptoms, but this influence did not carry over to alcohol consumption. This might be attributed to Gen Xers' tendency to consume less alcohol than Millennials (i.e., in Study 1, Gen Xers had similar levels of alcohol consumption as Late Baby Boomers).

Path comparisons revealed that Millennials demonstrated weaker associations than did Gen Xers between alcohol consumption at Time 2, and both alcohol consumption at Time 1 and Depression at Time 2. In other words, Millennials' post-deployment alcohol consumption was less related to their previous alcohol consumption and Depression compared to that of Gen Xers. Perhaps some Millennials matured between Time 1 and Time 2, resulting in decreased drinking. This phenomenon is common in young adults

who “mature out of alcohol misuse” after their 20s (e.g., alcohol use, alcohol-related problems; Keough & O’Connor, 2016, p. 33). Alternatively, they may have found alternative coping strategies (e.g., support from comrades, friends, family, spouse). As such, the impact of Time 1 alcohol consumption on Time 2 may have been reduced. Conversely, Gen Xers, as the older of the two generations, may have been more established in their drinking behaviours at Time 1, resulting in stronger associations with drinking behaviours at Time 2. Taken together, these results point to generational differences in the post-deployment SSAC model.

**Interesting/anomalous results.** The association of rank with Combat Exposure and strain was expected because NCMs have previously reported significantly higher levels of Combat Exposure, Depression, and PTSD than officers (Boulos & Zamorski, 2013; Riddle et al., 2007). However, in contrast to past research, rank did not contribute to alcohol consumption over and above the other control variables. This is likely attributed to age, which had a strong relation with alcohol consumption and strain and is generally positively correlated with rank: As members age and mature, they are promoted to higher ranks due to their cumulative experiences and improvements in performance. Furthermore, rank was dichotomized (NCM/officer) rather than comprising of more categories (e.g., junior NCMs, senior NCMs, junior officers, senior officers) among which differences have been previously observed (e.g., deployment roles, deployment reactions; Brown, 2004).

Counter to expectations, the number of previous deployments was not associated with levels of Combat Exposure, Depression, PTSD, and alcohol consumption. However, a more in-depth review of the literature revealed some inconsistent results in past

research. While the number of previous combat deployments has repeatedly been found to be associated with strain in research on the U.S. military (i.e., Afghanistan; Adler et al., 2005; Iversen et al., 2009), this has not always been the case in research on the UK Armed Forces (Fear et al., 2010). The diverging result in the present study may also be attributable to the inclusive nature of the definition of deployments that was used, which included domestic operations (e.g., Winnipeg flood), peacekeeping operations (e.g., Bosnia), and combat operations (e.g., Afghanistan). Thus, the composition of participants' deployment types (e.g., a combination of all three types of operations, a mix of peacekeeping and combat operations, or multiple deployments to Afghanistan) could not be deciphered. Although peacekeeping has been associated with Depression and PTSD (Blanc & Kelloway, 2014), peacekeeping deployments tend to be non-life threatening, low intensity, and non-traumatic, whereas combat deployments tend to be life threatening, high intensity, and have a high potential for traumatic events (Adler et al., 2005). As such, peacekeeping deployments may not be as strongly related to strain or alcohol consumption (e.g., members may be less prone to experiencing feelings of helplessness, as a stressor, after a peacekeeping deployment; Adler et al., 2005). Nonetheless, this result was aligned with findings of another CAF study, where the number of previous deployments in Afghanistan was not independently associated with diagnosed mental health conditions post-deployment (Boulos & Zamorski, 2013). This leads one to consider whether the healthy warrior effect was at play. It could be that only those members who were psychologically and physically fit—healthy warriors—were sent on multiple deployments (Haley, 1998; Larson et al., 2008; Williams et al., 2015; Wilson et al., 2009). Alternatively, the simplest rationale may be that too few participants

had multiple deployments (i.e., for almost 70% of members, this was their first deployment).

**Study comparisons.** When looking across studies, several differences were noted. Alcohol consumption was most strongly directly associated with Negative Life Events, followed by Exposure to Violence, and then Combat Exposure. In the post-enrollment SSAC model, strain was weakly related to alcohol consumption, but this was not the case in the post-deployment SSAC model. Rather, strain had considerably stronger relations with alcohol consumption. Accordingly, it seems that strain may be credited with the increase in explained variance in alcohol consumption post-deployment. Plus, the association between Depression and PTSD was considerably stronger post-deployment in comparison to post-enrollment. Thus, one could surmise that strain has a larger direct impact post-deployment on alcohol behaviours than post-enrollment.

When comparing mediation effects, the indirect effect of Combat Exposure on alcohol consumption through PTSD was largest, followed by the indirect of Childhood Neglect on alcohol consumption through PTSD, and then the indirect of Combat Exposure on alcohol consumption through Depression. Nonetheless, the stressors/alcohol consumption associations were mediated by strain at both post-enrollment and post-deployment. PTSD, by and large, had stronger mediating effects. Again, one could conclude that post-deployment, military members are attempting to mitigate the symptoms of PTSD they are experiencing in response to their Combat Exposure through self-medication with alcohol.

On the whole, results of Study 2 provided valuable insight by shedding light onto the time continuum through the assessment of pretraumatic/Time 1 factors (i.e., stressors,

strain, previous alcohol consumption) and their influence on posttraumatic/Time 2 factors. Ultimately, covarying the pretraumatic/Time 1 factors provided a more rigorous assessment of the pathways characterizing the association between Combat Exposure and alcohol consumption.

### **General Discussion**

The primary goals of this thesis were to enhance our understanding of the factors associated with alcohol consumption among military personnel through the development of a SSAC model and to explore generational differences in alcohol consumption and the factors that influence alcohol consumption. This was achieved by developing a context-specific SSAC model in a high-risk culture—the CAF—and in a high stress environment—post-deployment. Combined, results support previous findings, improve our understanding of the mechanisms that influence alcohol consumption, and contribute to the stress literature. Moreover, the results of this thesis provide the CAF with guidance on alcohol-related interventions, programs, and policies.

Principally, the main objective was to explain why members of the CAF consumed alcohol. In Study 1, the initial SSAC model provided a modest explanation for alcohol consumption by identifying pre-existing factors that impacted members' alcohol consumption and levels of strain. In Study 2, the post-deployment SSAC model confirmed the SSAC model in a different context and provided an improved explanation for CAF members' alcohol consumption by illustrating the impact of combat experiences on members' strain and alcohol consumption. On the face of it, the post-deployment SSAC model illustrated the influences of stressors in the same way as post-enrollment; however, it was grounded in the post-deployment context, where strain/alcohol

associations and strain interrelations appeared to be making the strongest contributions to alcohol consumption. Finally, the post-deployment SSAC model with Time 1 covariates, which accounted for Time 1 stressors, strain, and alcohol consumption, provided the most comprehensive explanation for members' alcohol consumption by illustrating the cumulative impact of members' past experiences on their alcohol consumption post-deployment. The addition of Time 1 variables provided two important sets of results. First, their inclusion permitted a more rigorous and pure examination of the influence of combat experiences, free from the influence of members' past experiences. Second, their inclusion helped to identify pre-existing factors (i.e., life stressors, pre-existing symptoms of strain, or alcohol consumption) that continued to influence members' alcohol consumption in the post-deployment context. Ultimately, this provided insight into the impact of members' past experiences on their ability to deal with the influence of combat exposure. The discussion below highlights the major contributions of each of these findings.

### **Explaining Alcohol Consumption**

**SSAC model.** Foremost, the results of this thesis contribute to our theoretical understanding of the tension-reduction model. The first premise of the model—stressors produce an internal state of anxiety and tension—was demonstrated by the positive associations between the stressors and strain in both studies. The second premise—alcohol consumption reduces tension (e.g., stress, anxiety, or fear; Conger, 1956; Hopf et al., 2011)—provides an explanation as to why individuals drink when they are unable to cope with stressors. In Study 1, this was supported directly by the largely positive associations between stressors and alcohol consumption and indirectly by the positive

associations between strain and alcohol consumption. Moreover, support for the second premise was found with the significant mediating effects of strain on the relations between stressors and alcohol consumption. Unfortunately, recruits exposed to higher levels of stressors experienced higher levels of strain and, thus, engaged in greater levels of alcohol consumption. As such, results show how CAF recruits' alcohol consumption increased both directly and indirectly in response to stressors.

The social norms of excessive drinking in the military may also influence the stressors/alcohol consumption association (e.g., machismo posturing, *drink hard, play hard* philosophies, culture of self-sacrifice), as alcohol consumption may be more likely to be perceived as an acceptable method of dealing with stressors in an alcohol-permissive culture (Kazemi, Berry-Cabán, Becker, & Hiebert, 2013; Krieger, Pedersen, & Neighbors, 2017). Social environments that condone the use of alcohol as a method to reduce tension have been found to contribute to alcohol consumption (Puttler et al., 2018). Conversely, military members may perceive that they have no alternatives to alcohol consumption to cope with their stressors, due to negative associations prevalent in the military regarding (a) seeking medical help, of any kind; and (b) seeking mental health assistance (i.e., due to the macho environment of the military, stigma). Social learning theory models of alcohol use posit that in the absence, or unavailability, of other methods of coping, alcohol is perceived as a viable option (e.g., Cooper, Russell, Skinner, Frone, & Mudar, 1992).

Although the pathways to alcohol-use disorders were not examined, it was believed that an understanding of the pathways to alcohol consumption (which includes a wide range of alcohol-related behaviours on a continuum, from normal to harmful use)

would be the most relevant, as such behaviours are applicable to the majority of CAF members. Moreover, the examination of the pathways to alcohol consumption provides insight that can be applied proactively to the prevention of alcohol consumption before it reaches a diagnosable level (i.e., before it becomes an alcohol-use disorder diagnosable in DSM V). This offsets its limitation to generalize to members with alcohol-use disorders.

**Post-deployment SSAC model.** The contributions of Study 1 included supporting the tension-reduction model, demonstrating the efficacy of the SSAC model to examine alcohol consumption, and providing a baseline for future comparisons. Study 2 provided further support for the tension-reduction model by confirming the SSAC model in a different and more stressful context, with a context-appropriate stressor (i.e., Combat Exposure). Thus, it was possible to address shortfalls noted in previous stressor-strain models (e.g., de Jong et al., 2001; Frone, 2004, 2008). The post-deployment SSAC model added to our understanding of the pathways that influence alcohol consumption in CAF members recently deployed by explaining more variance in alcohol consumption. After a tour in Afghanistan, where the chaos and the carnage of war were witnessed, Combat Exposure had stronger associations with strain than with alcohol consumption, but its indirect effects on alcohol consumption through strain were also considerable. The inclusion of five stressors across two models was considered necessary to obtain a more comprehensive picture of the negative and traumatic events faced by CAF members. This provides greater benefits than merely focusing on the worst traumatic event, which has been recognized to be too limiting (de Jong et al., 2001). The cumulative nature of negative events, namely polyvictimization, was accounted for within the SSAC model

with the addition of previous life stressors, strain, and alcohol consumption assessed at Time 1.

**Post-deployment SSAC model with Time 1 covariates.** There was considerable value added with the inclusion of Time 1 variables as covariates in the post-deployment SSAC model. Foremost, in line with the intended purpose of doing so, assessing health at enrollment created a baseline measure that could be used to prospectively examine the impact of previous health concerns, thereby permitting an unbiased assessment of risk factors for post-deployment issues (Lee & Hachey, 2011). Both the Canadian and U.S. militaries have undertaken research on recruit health for this purpose (Hyams et al., 2002; Lee & Hachey, 2011). This is an improvement over some longitudinal studies that include baseline risk factors that are not truly pretrauma (e.g., Time 1 is post-deployment [i.e., after the combat] in some cases, and then Time 2 is a three-year follow-up; Milliken et al., 2007; Smith et al., 2014).

First, an isolated examination of the influence of Combat Exposure alone was facilitated by adjusting the post-deployment SSAC model with the baseline information (i.e., Time 1 results). The cumulative effects of multiple adverse and/or traumatic events have been known to influence stress outcomes in the long term (i.e., polyvictimization). Indeed, polyvictimization has been found to increase the risk of developing alcohol dependency, alcohol-related problems, and mental health problems (Dube et al., 2002; Fairbank et al., 2014). After adjusting the post-deployment SSAC model with baseline information, an increase in the explained variance in alcohol consumption was noted, indicating that this version of the SSAC model provided a more complete account of the pathways leading to alcohol consumption. The direct effect of Combat Exposure on

strain, especially PTSD, was stronger than its direct effect on alcohol consumption. As well, the indirect effect of Combat Exposure on alcohol consumption through Depression was weaker than it was through PTSD, but stronger than the indirect effects of stressors observed in Study 1. Thus, with baseline measures of previous stressors accounted for, results provided stronger evidence of the influence of Combat Exposure on alcohol consumption among CAF members.

Second, the inclusion of Time 1 variables allowed for long-term vulnerability and risk factors to be teased out. Vogt and colleagues' (2014) temporal model of PTSD risk factors was applied to categorize CAF members' pretraumatic risk factors and identify vulnerabilities for strain and alcohol consumption post-deployment. Here, two categories for pretraumatic risk factors are recognized: (a) pre-existing attributes (e.g., demographic characteristics), and (b) prior experiences (e.g., past exposure to trauma).

*Pre-existing attributes.* Previous research has identified age, sex, and marital status as pre-existing attributes related to alcohol consumption (e.g., Adler et al., 2004; Adler et al., 2005; Bray et al., 2003; Burnett-Zeigler et al., 2011; Mensch & Kandel, 1988; Rona et al., 2009). As a well-established pre-existing attribute for alcohol consumption, age was found to be negatively associated with alcohol consumption in both studies. In line with some past studies, age was also found to be negatively related to strain in Study 1 (Conner et al., 2009; Weitzman, 2004). However, in Study 2, age was found to be positively associated with both Depression and PTSD. This is not only counter to Study 1, but also to other research (Hammen, 2005; Yang et al., 2010). Given that cumulative long-term effects of PTSD were found (with Time 1 PTSD associated with both Time 2 Depression and Time 2 PTSD), it is possible that some members who

joined the CAF with PTSD retained their symptoms as they aged. In addition, it could be postulated that older members were more likely to experience symptoms of PTSD because they had been deployed a greater number of times.

A pre-existing attribute that is applicable for Depression, PTSD, and alcohol consumption is sex. Research shows that sex differences in response to stressors are persistent: The positive association between stressors and alcohol consumption is weaker among women than among men, as women are more likely to seek social support in response to stressors, whereas men are more likely to drink alcohol (Hopf et al., 2011). Results of this thesis support past research on sex differences in alcohol consumption, as males reported higher levels of alcohol consumption than did females (e.g., Cooper et al., 1992; Jacobson et al., 2008). Nonetheless, a post-hoc comparison of AUDIT drinking patterns pointed to a reduction in this gender gap (Dawson et al., 2015; Thomas, 2012). Although higher proportions of males reported hazardous drinking (25%) than females (7%) post-deployment, their proportions of harmful drinking were similar (males 2.5% and females 2%). Research has pointed to a tendency for females to be socialized to internalize their distress and for males to be socialized to externalize their distress. The finding that females reported higher levels of depression than males, who reported higher levels of alcohol consumption lends some support to this view (Cooper et al., 1992).

Marriage was also found to be a protective factor in Study 1, with married recruits reporting lower levels of Depression and PTSD. However, in contrast to past studies, no difference was found in Study 2 for either Depression or PTSD by marital status (Burnett-Zeigler et al., 2011; Pietrzak et al., 2011). It is possible that marital status and the number of deployments interacted, such that those with more deployments were more likely to be

divorced and, thus, less likely to benefit from the protective effects of marriage. This warrants further examination.

*Prior experiences.* Because past research has found that trauma and psychological symptoms experienced prior to a deployment influence mental health after a deployment, identifying prior experiences that might serve as risk factors for alcohol consumption was of great interest (Nelson et al., 2011; Rona et al., 2009). Evidence of the cumulative, long-term impact of previous life stressors was found, with Negative Life Events and Childhood Adversity influencing post-deployment strain (Agorastos et al., 2014; Brewin et al., 2000; Cabrera et al., 2007; Clarke-Walper et al., 2013; Hammen, 2005; Lee et al., 2017). Furthermore, as expected, earlier symptoms of strain were positively associated with post-deployment strain. Together, these findings underline the potential long-term impact of mental health issues and highlight the need for interventions prior to deployment (e.g., after basic training for high-risk individuals). Rona and colleagues (2009) advocated that “the transferability of psychological features over time” explains why previous psychological symptoms influence PTSD after Combat Exposure (p. 17). Lastly, also supporting previous research, enduring drinking habits were observed between the two periods, with previous alcohol consumption positively influencing post-deployment alcohol consumption (Blume et al., 2010; Browne et al., 2008; Jacobson et al., 2008). The high degree of comorbidity among Depression, PTSD, and alcohol consumption provides an additional rationale for the long-term effects of these mental health illnesses (e.g., Basile et al., 2004). Accordingly, prior experiences that were identified as risk factors for Depression were higher levels of Childhood Adversity, as well as higher levels of Depression and PTSD. For PTSD, these were higher levels of

Negative Life Events, Childhood Adversity, and PTSD. For alcohol consumption, this included previous alcohol consumption and Depression.

Together, the results of this thesis contribute to our understanding of pretraumatic risk factors for alcohol consumption and strain (Vogt et al., 2014). In addition, the findings from Study 2 provide a temporal timeline for antecedents of post-deployment Depression, PTSD, and alcohol consumption (Kraemer et al., 1997, Vogt et al., 2014). Sequentially and cumulatively, Study 1 and Study 2 each contributed to our understanding of how CAF members develop mental health issues or alcohol-related problems. Of additional interest were the changes that occurred longitudinally in alcohol consumption and strain between post-enrollment and post-deployment.

### **Changes Over Time**

Changes between Time 1 and Time 2 were noted for alcohol consumption and strain.

**Changes in alcohol consumption.** In both Study 1 and Study 2, approximately 25% of members reported hazardous and harmful drinking patterns. These findings are similar to proportions reported in past studies of U.S. military members (29%; Hawkins et al., 2010). However, to provide a better account of individual changes in alcohol consumption over time, paired data from Study 2 was used. The lack of significant differences in alcohol consumption between Time 1 and Time 2 (based on a paired t-test) does not tell the full story in terms of changes to alcohol consumption. An examination of drinking patterns revealed that although the proportion of participants who reported harmful drinking behaviours at Time 2 (2.4%) was higher compared to Time 1 (1.8%), the remainder of comparative results pointed to healthier alcohol consumption behaviours

at Time 2. Specifically, there was a notable reduction in hazardous drinking (from 30% to 23%) and an increase in normal drinking behaviours at Time 2 (from 68% to 75%). This was higher than rates found in the general Canadian population where hazardous drinking was 17%, but lower than for younger Canadians (i.e., 19 and 24 years of age; males 36.8%, females 24.5%; Adlaf et al., 2005; Thomas, 2012). The opposite was expected based on past research comparing pre- to post-deployment.

Counter to previous post-deployment research, alcohol consumption did not increase between Time 1 and Time 2 (Bray et al, 2010; Brown et al., 2012; Browne et al., 2008; Clarke-Walper et al., 2013; Hoge et al., 2004; Hooper et al., 2008; Jacobson et al., 2008, Mehlum et al., 2006; Wagner & Jakupcak, 2012; Wilk et al., 2010). However, the lack of increase in alcohol consumption post-deployment cannot be taken as conclusive evidence that exposure to combat did not result in increased alcohol consumption for some members. Rather, the results reveal that, on average, these CAF members did not increase their alcohol consumption from the time they enrolled until after their deployment. There are several possible interpretations for these results.

First, this study differs methodologically from most pre-/post-deployment studies on alcohol consumption in terms of the assessment periods. In this study, Time 1 measures were taken during pre-enrollment as opposed to pre-deployment. Thus, a greater period would have elapsed from pre-enrollment to post-deployment in the majority of cases. Nevertheless, failure to have observed changes in alcohol consumption from Time 1 to Time 2 is not counter to the persistent negative association between age and alcohol consumption (Colder et al., 2010; Kuntsche et al., 2010; Thomas, 2012). Some members may have *matured out* of their problematic drinking patterns (i.e., a developmentally

limited pattern of alcohol use disorder; Husson, Rothenberg, Smith, & Haroon, 2018). This would have been especially true for members who participated in a deployment much later in their career (e.g., they enrolled in 2003 and deployed in 2010). Part of the reason for developmentally-limited alcoholism is that individuals entering young adulthood change their social goals in a way that is no longer compatible with excessive alcohol consumption (e.g., a shift from focusing on socializing to wanting to find a life partner and/or establish a career; Husson et al., 2018). Another possible explanation is there was insufficient longitudinal data post-deployment (i.e., most measures were taken 6 months after a deployment). Yet, there may be delayed onset of some mental health illness (e.g., Depression, PTSD, or alcohol consumption), which could be ascertained with additional assessment post-deployment (e.g., at 12, 18, or 24 months post-deployment).

Further, it is possible that not all members changed their drinking habits in the same way. Although Smith and colleagues (2014) found an overall decrease in the proportion of U.S. military personnel “who self-reported hazardous drinking behaviours” between pre-deployment and post-deployment alcohol consumption, they also identified an increase in newly-started hazardous drinking between the two periods (p. 273). As such, it may have been more helpful to examine changes in drinking patterns or classification of drinker (not just levels of alcohol consumption based on a single measure) to gain a full picture of changes in alcohol consumption over time (Smith et al., 2014).

**Changes in strain.** Over time, increases were noted in Depression both for the average number of symptoms reported and the proportions of military members reporting

moderate to severe levels of Depression (i.e., increases of 1.2% participants reporting moderate levels, 1.5% in moderately severe levels, and 1.2%, or double, in severe levels of Depression). Post-deployment increases in Depression are common (Larson, Booth-Kewley, Highfill-McRoy, & Young, 2009; Mehlum et al., 2006). However, an anomalous finding was that reported levels of PTSD, on average, were lower post-deployment than post-enrollment. In contrast, increases in PTSD have been reported following deployment in research on both U.S. military personnel (Mehlum et al., 2006) and UK Armed Forces personnel (Fear et al., 2010).

At Time 2, the average number of PTSD symptoms and the proportion of participants at medium risk for PTSD were lower, while the proportion of participants at low risk increased and there was no meaningful change in those at high risk. Reasons that might account for failure to have observed an increase in PTSD symptoms following deployment are unclear. It is possible that PTSD symptoms decreased for some participants, while they increased for others between the time periods. One could speculate that participants who showed improvements in PTSD found support, either formally (e.g., treatment from mental health care services) or informally within the CAF (e.g., through comradery) over this period. Furthermore, results may have been influenced by the healthy warrior effect (e.g., reduced PTSD symptoms) among participants who have been deployed previously (31% of the sample).

### **Generational Differences**

Of note, both Study 1 and Study 2 added to our understanding of alcohol consumption by suggesting differences among generations. Few studies have assessed generational differences over time (e.g., Moore et al., 2005) and even fewer have assessed

generational differences in a complex SSAC model. Study 1 provided some support that generation is a confounding factor of alcohol consumption (Blow et al., 2002a; Booth & Blow, 2002; Levenson et al., 1998; Meyers et al., 1981; Moore et al., 2005), although this was not the case in Study 2. Generational differences were noted in the SSAC model, lending support to the contention that age alone does not tell the whole story regarding differences in alcohol consumption in reaction to stressors. Study 1 also yielded interesting results, with Late Baby Boomers reporting alcohol consumption at levels similar to those of a younger generation—Gen Xers. Moreover, results provided suggestive evidence to support the previous contention that Late Baby Boomers, at least in this military sample, are not slowing their alcohol consumption to the expected degree. This might be attributable to Late Baby Boomers being raised at a time when attitudes towards alcohol consumption were more permissive (e.g., drinking and driving was more accepted) and acclimated into the CAF when regulations concerning alcohol consumption were less restrictive (e.g., alcohol consumption was permitted on deployments and ships). Additionally, Late Baby Boomers, especially those who chose to join the CAF at a mature age, may possess more effective or alternative coping strategies than alcohol consumption to handle stress. However, when examining drinking patterns across age, Russell and colleagues (2004) discovered that problem drinkers had age-related increases in drinking frequency, while decreases were noted in the usual volume drunk and heavy-drinking rates with age. Again, it may have been worth considering changes in drinking patterns across generations.

Lastly, at least in the post-enrollment context, even after accounting for age, Millennials demonstrated higher alcohol consumption than older generations. As the

younger generation, Millennials were likely within the emerging adulthood phase of development. Although the young are often unmarried, one notable trait of Millennials is their delayed display of traditional markers of adulthood (e.g., marriage, parenthood). They tend to focus their attention on self-exploration, striving for financial independence, and establishing world views and personal values before settling down. They have also been settling down later than traditionally found in the past (e.g., 25 years of age; Arnett, 2000, 2007; Furstenberg, 2010). As the youngest generation, Millennials may have also differed in their cognitive appraisals of stressors, especially Combat Exposure. They may have been more prone to experiencing strain in response to these stressors or had a greater inclination to use avoidance-coping strategies, resulting in increased alcohol consumption.

The inability for generation to predict over age in Study 2 may be attributable to the cohort-generational identity (Joshi et al., 2010), which in this context would be that all participants had been on a deployment where alcohol consumption was prohibited. Alternatively, as other generational researchers have lamented, the challenges of separating age, cohort, and period effects have plagued cross-sectional designs (Study 1) making it difficult, if not possible, to truly measure the pure effects of generation (Rudolph & Zacher, 2018). Even though Study 2's prospective design provides some improvement with two distinct time periods (Lyons & Kuron (2014), the limited generational differences do not provide overwhelming evidence of generational differences.

The results of this thesis elucidate the pathways to alcohol consumption for CAF members through the SSAC model, illustrated how CAF members' reactions over time

did not always conform to those of other militaries, and provided some insight into generational differences in alcohol consumption. Some features of this thesis facilitated the examination of the hypotheses while others hindered this pursuit. A discussion of the strengths and limitations of this thesis sets the stage for consideration of the application of its results and identification of the areas warranting further examination.

### **Limitations and Strengths**

**Limitations.** Despite the support for most hypotheses, some limitations must be acknowledged. First, the data used was archival. As such, the study was limited to examining only those factors that were already assessed. Data on several other factors that may have also influenced alcohol consumption were not available for analysis.

***Self-report limitations.*** Second, self-report measures are subject to a certain degree of bias, especially the underreporting of behaviours perceived as negative due to the social desirability bias. This may be particularly salient when participation is not anonymous, which was the case for both surveys. Due to the negative stigma associated with alcohol abuse and mental health issues, participants may have underreported symptoms of both. Therefore, the magnitude of the relations found may have been underestimated (e.g., Currier, Holland, Jones, & Sheu, 2014; Dube et al., 2001). Nonetheless, self-report use of alcohol and past stressors has been shown to be reliable and valid, even for retrospective responses (e.g., reporting of childhood experiences as in the Recruit Health Questionnaire; Brewin et al., 2000; Cherpitel, 2007; Del Boca & Darkes, 2003). In fact, Czarnecki and colleagues (1990) demonstrated that recall of alcohol consumption as distant as five years was found to be accurate. In addition, self-reports of substance use are considered non-invasive, acceptable to participants, and

relatively inexpensive to collect (Darkes, 1998). “Despite their potential limitations, self-reports often may be the best source of data we have on employee alcohol and illicit drug involvement” (Frone, 2013, p. 25).

Furthermore, additional military cultural beliefs may have further exacerbated the tendency to underreport. Beliefs about strength, resilience (e.g., mental toughness perceptions; Kang et al., 2015), as well as the negative stigma associated with mental illness in a military culture (Nelson et al., 2011) have been found to prevent U.S. military members from seeking the mental health care they need in previous research (Burnett-Zeigler et al., 2011; Hoge et al., 2004; Wagner & Jakupcak, 2012). Stigma has been linked to concerns about being perceived as weak, having negative military career implications (e.g., from the loss of a promotion to the loss one’s military career entirely), and being treated differently by peers and leaders. Unfortunately, in some cases, the basis for these fears is founded (Burnett-Zeigler et al., 2011). However, the degree of bias is unknown because the levels of reported strain and alcohol consumption were based on self-reports rather than an actual diagnosis (Lee, Sumner, et al., 2015). Accordingly, alcohol consumption, reactions to stressors, and reports of strain could have all been more problematic than this thesis indicates (i.e., underreporting due to less socially desirable behaviours and the stigma-associated mental health problems; Rona et al., 2009).

Another limitation was that Combat Exposure was only assessed based on a count of the number of combat events experienced during members’ most recent deployment. It is recognized that some of these combat experiences are more traumatic and could have larger impacts on strain and alcohol consumption than others because they may have been more intense or life threatening (e.g., seeing injured children versus seeing a member of

one's unit blown up; Fear et al., 2010; Gallaway et al., 2013; Mehlum et al., 2006; Sudom, Watkins, Born, & Zamorski, 2016). The reporting of combat vis-à-vis a checklist also introduced error associated with personal interpretation (defining and interpreting the event; San José et al., 2000). As well, in some cases, numerous combat events could have occurred concurrently (e.g., after an IED attack participants witnessed the death of others; Castro & Adler, 2011). This is also true of the Negative Life Events scale, which is also a check-list (Hammen, 2015). Further, members were only asked about their recent combat experiences and not those from previous tours. Yet, the cumulative effect of traumatic events could also have explained strain and alcohol consumption (e.g., pretraumatic risk factors; Vogt et al., 2014). Conversely, the positive effects of deployment, such as posttraumatic growth, were not examined. Their occurrence may have partly explained the absence of alcohol consumption or reduced impact of strain (e.g., a buffering effect; Wilk et al., 2010).

The choice to focus on a continuum of alcohol consumption came at the cost of not being able to focus on those members who are abusing alcohol to dangerous levels, specifically harmful alcohol use and alcohol use disorders. Members at these dangerous levels of alcohol consumption may have different pathways that lead to alcohol-related problems and abuse. In some cases, the associations might be stronger because most mental illnesses have higher comorbidity with alcohol abuse (e.g., PTSD Pietrzak et al., 2011; Steward, 1996) and alcohol use disorders (e.g., Depression; Schadé et al., 2007). Pretraumatic risk factors, specifically prior experiences (e.g., Time 1 covariates, such as Childhood Adversity), may also play a different and/or stronger role for these participants, as evidenced by the finding that veterans suffering from PTSD have a higher

lifetime use of alcohol (Saxon et al., 2001). Because this group of members is likely at higher risk of harmful alcohol use, failure to assess pathways characterizing their alcohol consumption is a gap.

**Generalizability.** Although a large sample of CAF recruits with a known high response rate (75%) was used for Study 1 and Time 1 of Study 2, there is uncertainty whether results can be generalized to all CAF Regular Force recruits during this timeframe, especially in light of the fact that participation rates in the Recruit Health Questionnaire have varied over the years (e.g., from as low as 56% in 2006 to as high as 81% in 2012; Lee, Sumner, et al., 2015). The same is true regarding the representativeness of previously deployed members of the CAF who participated in Study 2, given that a condition of being included in Study 2 was having one's Enhanced Post-Deployment Screening data paired with one's Recruit Health Questionnaire data.

Another condition of inclusion was to still be serving in the CAF to permit participation in the Enhanced Post-Deployment Screening. Data collected at Time 2 in Study 2 was based on actively serving members who were more likely to be physically and mentally fit (i.e., due to the healthy warrior effect) than members who had been released due to physical/mental illness (Haley, 1998; Kang et al., 2015; Larson et al., 2008; McLaughlin, Nielsen, & Waller, 2008; Nelson et al., 2011; Williams et al., 2015; Wilson et al., 2009). This limitation may apply more so to older generations, such as Gen X and Late Baby Boomers, who would have had more deployments (e.g., unhealthy members may have released or not returned on this deployment). Accordingly, this sample might not be representative of those suffering from the greatest degree of strain and alcohol consumption (e.g., CAF members who were not able to deploy due to their

health condition). Conversely, by examining all members regardless of occupation (e.g., infantry vs clerk) or employment environment during the deployment (e.g., off base closer to the enemy vs on a secure base), any differences on these bases could not have been found and may have underestimated the reactions of members at higher risk (i.e., combat members in forward operating bases; Castro & Adler, 2011; Iversen et al., 2008).

When considering limited generalizability, two at-risk populations spring to mind—females and Reserve Force members. The CAF is a male-dominated organization, so females are the minority. While the female representation in Study 1 was comparable to that of CAF population, this was not the case in Study 2, where the females were significantly under-represented. Nevertheless, this would be expected in an operational deployment comprised mainly of combat arms occupations, which are male-dominated. Because females have been shown to report higher rates of Depression and PTSD, react to Childhood Adversity more frequently with alcohol and drug abuse, and consume less alcohol than males (e.g., Adler et al., 2005; Conner et al., 2009; Dawson et al., 2015; Epstein et al., 1998; Rehm, Taylor, et al., 2006; Thomas, 2012; Wagner & Jakupack, 2012; Weitzman, 2004), results for females alone might have differed. Brown and colleagues (2012) found that females reported similar levels of alcohol-related problems and alcohol dependence as males even though they drink less than males, indicating that they are at higher risk for such conditions. In one study of CAF veterans, females did not report the same increase in their frequency of drinking and alcohol-related problems as did males in response to Depression and PTSD (Fetzner et al., 2013). As mentioned previously, similar proportions of harmful drinkers were found between males and females in Study 2. Similarly, among military members who are not serving within the

Regular Force, such as CAF Reserve Force members and U.S. National Guard members, stronger associations between alcohol and stress, higher risks for PTSD and depression, and the lowest rates of seeking mental health care post-deployment than regular serving members have been observed (e.g., Blume et al., 2010; Burnett-Zeigler et al., 2011). This is often attributed to differences in reintegration experiences: Reserve Force members usually return to a civilian job upon return from a deployment and are thereby isolated from military comrades who understand and were also experiencing the challenges of reintegration into their non-military lives. As such, results of the present thesis may not generalize to Reserve Force members, CAF females, or females in general. Accordingly, assessing the replicability of findings in these at-risk populations is warranted.

*Statistical limitations.* Several statistical limitations also warrant consideration. Study 1 was cross-sectional, such that causality cannot be inferred from the results. Also, the effect sizes observed in both studies were small (indirect effect sizes from .002 to .019 and total indirect effect sizes from .013 to .049). This is not uncommon in mediation, but some caution with interpretation is still warranted (Cohen, 1988; Preacher & Hayes, 2008; Preacher & Kelley, 2011). Alternatively, Preacher and Kelley cautioned against focusing on the effect size and advocated greater concern for the practical importance of results. When dealing with mental health issues and detrimental alcohol consumption behaviours, even small effect sizes can be of practical importance for members' physical and mental health, as well as the secondary impacts of alcohol consumption on family, careers, and organizations. For CAF leaders, mental health professionals, and policy makers, even small effect sizes can be practically significant for guiding prevention and intervention strategies on alcohol consumption.

Further, the data for Depression and PTSD in both studies had higher than normal levels of skewness and kurtosis. When dealing with psychological strain, a non-normal distribution is not unusual (e.g., McCuiag Edge & Ivey, 2012; Nelson et al., 2011). However, this limitation is offset because an added benefit of the bootstrapping sampling approach that was used for all mediation analyses is its non-reliance on the assumption of normality (Preacher & Hayes, 2004).

**Strengths.** The limitations of these studies are offset by their strengths. Perhaps the greatest strength in the present thesis was the merging of two different bodies of research—stressor-strain-outcome and generational differences—to better understand alcohol consumption across in the Canadian military context.

Second, these studies provided a rigorous assessment of the SSAC model due to several methodological features. The inclusion of multiple stressors permitted a comparison to identify the most influential stressors on alcohol consumption and strain, thereby addressing the issue of polyvictimization (de Jong et al., 2001; Dube et al., 2002; Fairbank et al., 2014). Moreover, the model was re-assessed in a higher stress context—post-deployment—with Combat Exposure as a fifth stressor, thereby contributing incrementally to understanding the conditions under which military members misuse alcohol. Theory has highlighted the importance of context in understanding the pathways between stressors and alcohol consumption because different contexts are associated (Dolan & Enders, 2008; Keough et al., 2015). In addition, Childhood Neglect was included as a distinct stressor, which is unusual, as it has typically either been examined in combination with Childhood Adversity or has been excluded from analyses altogether in past research on CAF members (Lee, 2008; Lee et al., 2016). Its inclusion revealed that

Childhood Neglect has distinct and different associations with strain and alcohol consumption than Childhood Adversity (i.e., stronger associations with strain in comparison to other stressors, in addition to having a negative impact on alcohol consumption). Unfortunately, exposure to one type of childhood abuse may increase one's propensity for being exposed to additional types of adverse childhood experiences (e.g., neglect, domestic violence, crime), which is why researchers advocate the inclusion of multiple types of adverse childhood experiences to better understand their long-term health implications (Dong et al., 2004; Dube et al., 2001).

In addition, the SSAC model was assessed with two indicators of strain. This permitted their comparison and provided greater insight into the risk factors for alcohol consumption (i.e., PTSD). Furthermore, Study 2 was used to re-assess the SSAC model to ensure that it fit with a second dataset, and that it predicted alcohol consumption in the same manner as the original model (i.e., the model was confirmed). Moreover, the SSAC model was tailored for a specific environment where both stressors and a propensity to use alcohol were problematic—in the CAF, in general, and in a post-deployment context (Frone, 2004, 2008; Herold & Conlon, 1981). Failure to provide a contextualized account of alcohol consumption has been identified as a deficit in previous stressor models (de Jong et al., 2001). Finally, the model accounted for demographic characteristics that have been known to influence the complex associations surrounding alcohol consumption, thus providing a more rigorous test of the model. Accordingly, the SSAC model addressed the shortfalls of previous work on simple stress-strain models through its assessment in a high-stress context and alcohol permissive culture, and development into a more tailored

model to account for both post-enrollment and post-deployment alcohol consumption among CAF members.

Together, Study 1 and Study 2 also somewhat extend our understanding of generational differences in alcohol consumption by including a wider spectrum of generations than some previous studies. To date, the focus on generational differences in alcohol consumption has been on older generations who make up a large part of the North American population (Blow et al., 2002b; Moore et al., 2005). While this research is noteworthy, given the aging Late Baby Boomers, it is also important to recognize that the two other generations differed in their pathways to alcohol consumption. To this end, the inclusion of younger generations was an important contribution even though the results were not definitive regarding generational differences.

The penultimate strength of Study 2 was its prospective nature. Many studies on alcohol consumption have been cross-sectional (Gallaway et al., 2013; Kuntsche et al. 2010). Although several other military studies have been conducted with two or more-time points (Jacobson et al., 2008; the Millennium Cohort Study in the U.S. military; Smith et al., 2014), “it is rarely the case that pretrauma assessments are available to researchers” (Vogt et al., 2014, p. 160). A paired-sample at two distinct and important periods permitted prospective comparisons instead of only cross-sectional comparisons. This provided not only a longitudinal evaluation of risk factors associated with alcohol consumption but also of generations, which has been recognized as a limitation of generational research (Cennamo & Gardner, 2008; Uhart & Ward, 2009). In addition, the use of baseline measures permitted unbiased comparisons at the individual level between two periods (Burnett-Zeigler et al., 2011) rather than relying on participants’ recollections

of their past data (which is subject to recall bias and memory accuracy; Rona et al., 2009). This research joins a relative short list of studies that have incorporated baseline information (Fear et al., 2010; Hooper et al., 2008; Milliken et al., 2007; Rona et al., 2009).

Lastly, the greatest strength of these studies was the ability to study a real-world problem. Because of the potential negative repercussions of alcohol consumption, it is important to arrive at a better understanding of the problem to generate evidence-based recommendations for how to best address it within the CAF.

### **Practical Implications**

The results of this thesis have the potential to provide valuable insights that could help the CAF, and, more importantly, individual members who are suffering from stressors, strain, and alcohol consumption, by providing insight into the severity of alcohol consumption in the CAF and potential interventions.

**Impact of alcohol consumption.** The degree of alcohol consumption by all members, especially the minority negatively influenced by Combat Exposure (Norris & Slone, 2014; Wagner & Jakupcak, 2012), impacts both the CAF, as an organization, and the affected individuals.

**Organizational costs.** In simplest terms, these studies provide insight into the prevalence of alcohol consumption in CAF members. When averaged, both during post-enrollment and post-deployment, approximately 25% of participants reported hazardous to harmful drinking patterns, and post-deployment, 6.7% were moderately-severe/severely depressed, and 2.4% reported probable PTSD. Military leaders will be concerned about the implications for these results for combat readiness and mental health,

which involve economic costs (Watkins, 2014). For U.S. veterans, the costs for medical care have been estimated to be as high \$10,000 for PTSD and \$25,000 for Depression per member two years post-deployment, and cumulatively upwards of six billion dollars (Eibener, Ringel, Kilmer, Liccardo Pacula, & Diaz, 2008). Although the costs have not been calculated for the CAF, they are assumed to be similar per person. This is considerable, given that, of the more than 40,000 members who deployed to Afghanistan, approximately one third has used mental health services since repatriating (Boulos & Zamorski, 2013). Alcohol-related problems also have many additional hidden costs for the CAF, as other organizations have noted impaired performance (e.g., reduced productivity), increased safety issues, reduced positive contextual performance (e.g., volunteering), as well as higher levels of counterproductive behaviours (e.g., physical and psychological withdrawal, aggression), absenteeism, and employee turnover (Bray, Hourani, Williams, Lane, & Marsden, 2014; Cherpitel, 2007; Frone, 1999, 2004, 2006; Hourani, Williams, & Kress, 2006; Lehmann & Simpson, 1992; Rehm, Taylor, et al., 2006). However, more disconcerting is that the CAF has lost many highly trained individuals, as research indicates that approximately 40% of members suffering from mental health illnesses post-deployment cannot continue their military careers (Boulos & Zamorski, 2016). Most important are the costs to the individuals suffering from combat-related illnesses.

***Individual costs.*** The impacts of alcohol consumption for individuals are well known, and include physical (e.g., reduced health, and increased accidents, physical aggression, violence, and violent crimes), professional (e.g., career implications, loss of job), and personal losses (e.g., negative impact on relationships, divorce; Boles & Miotto,

2003; Dolan et al., 2005; Foran & O’Leary, 2008; Mattiko, Olmsted, Brown, & Bray, 2011; McFarlin, Fals-Steward, Major, & Justice, 2001; Taylor, Haddock, Poston, & Talcott, 2007). Further, increased alcohol consumption, especially binge drinking, has been found to exacerbate the negative effects of PTSD (e.g., a tendency to be irritable, quick to anger, and hypervigilant; Savarese et al., 2001). Moreover, the common comorbidity of alcohol consumption with Depression and PTSD, coupled with the tendency for individuals to self-medicate with alcohol, can cause negative behaviours to spiral downward (Lehavot et al., 2014; Miller et al., 2016), because the existence of a combination of any of the three tends to exacerbate the severity of each (Swendsen & Merikangas, 2000). In fact, the mere presence of alcohol dependency is problematic because its knock-on effects include reinforcing and increasing already maladaptive drinking behaviours (Room, 2005). This is especially important since alcohol consumption was the prominent outcome of stressors and strain in these studies.

Unfortunately, there can be devastating and tragic outcomes when mental health problems are left untreated, such as increased alcohol-related problems, binge drinking, violence, spousal and child abuse, and suicide (Bliese, Adler, & Castro, 2011; Kang et al., 2015). Although there are conflicting reports about whether military suicide rates exceed those of civilians in both the CAF and U.S. militaries, research has found higher suicide rates among young, male CAF veterans who have served in the combat arms (D’Aliesio, 2017; Kang et al., 2015; Rolland-Harris, 2017). “The importance of early identification of at-risk individuals who may only be showing minimal to moderate risks of anxiety or depressive symptoms” has been stressed because of the significant association between

suicide ideation and both Depression and alcohol consumption (Burnett-Zeigler et al., 2011; Nelson et al., 2011, p. 1,487).

**CAF applications.** Briefly, the CAF has been very proactive in minimizing the impact of deployments on members' health and has a Mental Health Strategy designed to understand, educate, and care for members by providing evidenced-based mental health systems, interventions, and programs (Bernier, 2014). While many initiatives are in place to assist members post-deployment (e.g., psychoeducation at a third-location decompression program, the Enhanced Post-Deployment Screening process), and over the span of a career (e.g., the comprehensive evidence-based road to mental readiness program [i.e., R2MR] program adopted in 2007; Bernier, 2014), much of the focus is on mental health and not alcohol consumption per se. Notwithstanding the importance of having numerous counselling options available to members and the considerable efforts taken to reduce the stigma associated with mental health problems, increase confidentiality, and provide better career protection (Bernier, 2014; Blanc & Kelloway, 2014), these interventions and policies should also include strategies to decrease alcohol consumption. Thus, an enhanced understanding of the relation of stressors and strain on alcohol consumption has considerable potential to contribute to CAF policies, health promotion, and interventions.

***Alcohol consumption policies.*** Frone (2013) noted that alcohol- and drug-related policies are often made in the absence of scientific evidence. High alcohol consumption rates suggest a review of CAF policies concerning alcohol use/abuse is necessary. One barrier to detecting and intervening with alcohol consumption is that organizations are strict with drug use (zero tolerance), but not tough on alcohol consumption, in general or

at work (Frone, 2006). As such, CAF policies on alcohol use/abuse should be clear, focused on changing attitudes toward alcohol consumption, and consistently enforced. CAF policies also need to reflect that members coming forward with alcohol issues will be helped rather than being punished, which anecdotal evidence suggests may have occurred in the past. Within the U.K. Armed Forces, although new alcohol-use policies were implemented, it was also recognized that an attitudinal change about alcohol consumption was necessary (Browne et al., 2008). Accordingly, leaders at the highest ranks need to champion and communicate a non-permissive drinking culture to influence a cultural shift surrounding alcohol consumption (RAND, 2018). Ideally, the cultural shift would reduce heavy drinking, deglamorize alcohol use, and promote healthy living and a responsible alcohol consumption lifestyle and culture (Brown, 2007).

*Improving current interventions.* Further, a better understanding of the factors that best predict alcohol consumption has the potential to positively improve intervention or inspire new programs (e.g., behaviour modification), reduce excessive drinking, encourage drinking in moderation, and encourage reductions in the frequency of drinking and binge drinking in the CAF. Without the implementation of effective interventions, alcohol-related avoidable deaths are predicted to rise along with increased alcohol consumption, detrimental drinking patterns, and alcohol-related diseases (Rehm, Taylor, et al., 2006). The fact that, in the CAF, alcohol-related deaths exceed those attributed to combat (Tien et al., 2010) highlights the need for effective interventions and further research based on a SSAC model. Further, given the comorbidity of strain and alcohol consumption, the CAF may want to consider dual-approach interventions that deal

simultaneously with multiple mental health illnesses and alcohol consumption, as suggested by La Flair and colleagues (2013).

*Generational differences.* With the identification of some generational differences, interventions can be tailored for each generation and their alcohol-related issues (Williams et al., 2015). CAF Millennials, as young members who are predominantly males, are at higher risk for heavy alcohol consumption (Bray et al., 2010), but members of this generation have reported a greater need for social support, and assistance, coaching, and support from managers (Keeling, 2003; Marcus, 2014; Murphy, 2011). For this generation, interventions utilizing a more hands-on delivery method would likely be more effective, while alcohol consumption education and preventative programs may need to be more prescriptive and delivered by a trusted source (e.g., supervisor and peers). With the appropriate psychoeducation, supervisors could provide a safe, trusted, non-threatening environment to disclose alcohol consumption, and to alleviate their subordinates' fears about reporting alcohol consumption (e.g., being embarrassed, seen as weak, or treated differently; Burnett-Zeigler et al., 2011; Hoge et al., 2004; Wagner & Jakupcak, 2012). In addition, these current studies illustrate that the messaging aimed at Millennials should focus on reducing binge drinking and providing education about the increased risks associated with it (e.g., suicide; Kang et al., 2015). The message tailored for Late Baby Boomers should focus on reducing the frequency of drinking occasions and cautionary tales of alcohol consumption.

This new messaging could be applied to the CAF's current health promotion program for alcohol consumption. The CAF provides education through several paper/online brochures on a variety of topics, such as: (a) Canada's Low Risk Drinking

Guidelines in *Addictions awareness prevention - Stop and think before you drink*; (b) *Alcohol as stress management: Finding the balance*, which informs readers about how alcohol consumption can mask problems; (c) *How to keep safe while drinking*; and (d) the contact information for the local Health Promotion Office (CAF, 2017). While the brochures and internet sites provide excellent information, the messages are a one-size-fits-all approach.

In addition to the content, the medium used to deliver tailored messages to each generation is equally important (e.g., *Navigating the next generation of consumers*, 2017). The use of social media, whether it is Twitter, Snapchat, Instagram, Facebook, or the current choice-of-the-day social media, is ideal for younger generations, namely iGens and Millennials. Indeed, Facebook has been used to effectively recruit young veterans into online alcohol-intervention programs (Pedersen, Naranjo, & Marshall, 2017). iGens were born during the internet age and expect more interactive, readily available resources/interventions, while Millennials, who are equally internet savvy, would likely prefer coaching, and most Late Baby Boomers would prefer reading materials (Jones, Ramanau, Cross, & Healing, 2010). This emphasizes the importance of tailoring both the messages and the mediums in order to maximize efficacy across generations.

*Targeting at-risk recruits.* Notwithstanding current efforts by the CAF, additional interventions are needed and could be adapted to incorporate findings of these studies. The CAF has, by and large, adopted a preventative-science perspective regarding members. It is important to understand that at-risk recruits, who joined the CAF with established drinking behaviours, could benefit from interventions as early as possible within their military career (Ames et al, 2007). By offering interventions to recruits who

are at risk for future mental health issues, the CAF could (a) diminish the longer-term effects of previous life stressors throughout members' careers, leading to better mental health; (b) increase members' resiliency; and (c) potentially decrease members' negative reactions to future traumatic events, which could facilitate dealing with deployment stressors (e.g., Combat Exposure later in their careers; Hussong et al., 2018). Combined, these results would ultimately produce a stronger fighting force in the CAF. Results can be used to guide the CAF's choices about the mental health intervention topics or to advertise mental health services targeting the at-risk topics to entire cohorts of recruits.

While the very nature of military service requires members to put themselves at risk for physical and psychological injuries (formally referred to as unlimited liability; Blanc & Kelloway, 2014; *Duty with Honour: The Profession of Arms in Canada*, 2003), the CAF takes responsibility for the care of military members in those situations. However, this care could start earlier, before the deployments that put members at greater risk of physical and psychological injuries. The CAF should consider proactive, targeted action to assist new at-risk members. In addition to approaching at-risk members differently, there is also a need for new interventions.

***Innovative interventions.*** Some innovative interventions currently being developed could benefit from the knowledge gained in these studies. For example, an initiative to provide validated stress management training to members through a virtual environment (Bouchard et al., 2010) could include the creation of stress scenarios tailored for each generation. The scenarios could also include an educational component about alcohol consumption as a stress reliever. Furthermore, as this specialized training has limited resources, the results of this research could assist with identifying and prioritizing

members for this training who might be more susceptible to mental health issues post-deployment (e.g., members with high Childhood Adversity scores).

Similarly, information about generational differences and at-risk populations could be incorporated in a social normative approach—*personalized normative feedback*—that has been successful in reducing alcohol consumption behaviours (Pedersen, Parast, Marshall, Schell, & Neighbors, 2017). This feedback compares an individual's drinking habits to a personally relevant referent group (e.g., college students of the same gender for young veterans), thereby providing a social norm comparison. Early results show promise because it is brief, targets one component of alcohol consumption, negates a multisession program, and corrects misconceptions about peers' drinking habits, which tend to be overestimated (Pedersen, Parast, et al., 2017). Moreover, it has been shown to reduce the number of drinks per occasion, and the frequency of weekly drinking, binge-drinking days, and alcohol-related consequences, especially in heavy drinkers (Pedersen, Parast, et al., 2017). The relevant referent group could include generational information, as the more similar the referent group is to the individual, the more effective the personalized normative feedback approach is (Doherty et al., 2017). Additional features of the personalized normative feedback approach are that it can be used as a standalone intervention or as a component of a larger intervention and be delivered in person or online (Pedersen, Parast, et al., 2017).

There is a move towards brief alcohol interventions (e.g., 10 minutes) because they are showing great promise with civilians and few participants finish long, complex treatments (Doherty et al., 2017; Pedersen, Naranjo, et al., 2017). Brief alcohol interventions have been deemed an effective, inexpensive approach to addressing alcohol

consumption among young adult U.S. veterans (Martens, Cadigan, Rogers, & Osborn, 2015), but some conflicting results suggested that they are more effective when repeated over a longer duration (Doherty et al., 2017). Again, these interventions could be adopted by the CAF, and be targeted at generations and at-risk groups.

The tension-reduction theory espouses that “learned needs are likely to play an important role in the acquisition of drinking patterns” (Conger, 1956, p. 304), so it stands to reason that drinking behaviours could be unlearned. Accordingly, additional interventions could include (a) cognitive restructuring interventions to counteract overly positive views about the benefits of alcohol as a coping strategy, counter the negative perceptions of seeking mental health, and highlight the long-term negative consequences of alcohol consumption (Cooper et al., 1992); and (b) teaching more adaptive coping strategies (e.g., anger management training to deal more effectively with negative emotions, which often prompt alcohol abuse) and stress management techniques (e.g., problem-focused coping skills, concrete examples of positive alternatives to alcohol consumption; Cooper et al., 1992; Folkman & Lazarus, 1988).

**Implications for Veterans Affairs Canada.** With Late Baby Boomers aging and retiring, Veterans Affairs Canada may find the generational differences in alcohol consumption useful to anticipate the treatment needs of this large generation. This is likely especially true for Late Baby Boomers, who were found to have similar alcohol consumption as Gen Xers. In the U.S., due to Baby Boomers’ propensity for substance abuse, it is estimated that the number of adults over the age of 50 with substance abuse problems will double to five million by 2020, at which time approximately 50% of elderly

persons will be in a high-risk group versus 9% in 1999 (Gfroerer, Penne, Pemberton, & Folsom, 2002).

### **Future Research**

Although the SSAC model achieved the objective of explaining the pathways leading to alcohol consumption and explained progressively more of alcohol consumption as it was further developed (from 12% to 20% to 28% of the variance in alcohol consumption), a substantial amount of variance was left unexplained. The unexplained variance indicates that additional factors may be influencing alcohol consumption. This does not diminish the value of the results of this thesis, but rather confirms that the pathways leading to alcohol consumption and alcohol use disorders are numerous, complex, dynamic, systemic, and that they involve numerous alternative risk factors (e.g., family, friends, community, culture, genetics; Puttler et al., 2018). Indeed, the alcohol use disorder has been described as a heterogeneous disorder for this reason (Hussong et al., 2018). These studies initiated research into the pathways to alcohol consumption in the SSAC model—an important first step. As such, several areas of research are suggested to better explain alcohol consumption and elaborate upon these studies.

**Longitudinal impact.** First, results bring to light questions about what happened to CAF members after their initial return from deployment (i.e., six months post-deployment). The impacts of deployment and Combat Exposure on alcohol consumption have been estimated to continue three to five years post-deployment, depending on the military in question (e.g., alcohol consumption reductions were noted three-years post-deployment for the US but not in the UK; Fear et al., 2010; Hooper et al., 2008; Rona et al., 2016; Milliken et al., 2007). The extended impact is attributable, in part, to the

delayed onset of symptoms, diagnoses, and referrals to mental health care for alcohol consumption and mental health distress (e.g., PTSD, depression), which have been found to range from six months to six years (Boulos & Zamorski, 2016; Goodwin & Rona, 2013; Fear et al., 2010; Mehlum et al., 2006; Milliken et al., 2007). Accordingly, future research should replicate the SSAC model with participants at several additional periods post-deployment (e.g., 12, 18, and 24 months) to ascertain the long-term effects of the deployment, and specifically Combat Exposure.

**Military culture.** Next, consideration was given to alternative mechanisms that might contribute to alcohol consumption and account for additional variance. Here, environmental stressors might play a role because they can facilitate individuals' use of alcohol to reduce the influence of stressors (Hussong et al., 2018). Additional environmental stressors of the military that were not examined in these studies are: time away (e.g., training, taskings), cumulative Combat Exposure (across multiple tours), tour duration, employment on tour (e.g., location, nature of work), and number of combat deployments (i.e., teased out from peacekeeping missions). However, a most pervasive environmental stressor that was not considered is the actual degree of alcohol permissiveness in the CAF.

Although the SSAC model was assessed in context of the CAF, the CAF's drinking culture was not assessed per se. A considerable amount effort has gone into understanding the role military culture plays to create an *entrenched drinking culture* in the U.S. military and the UK Armed Forces (Ames et al., 2009; Iversen et al., 2009; Jones & Fear, 2011; Poehlman et al., 2011). Areas of the military's culture that have contributed to a permissive drinking culture have included confusion about the policy, resentment

about changes to policies, and inconsistency in the application of alcohol policies (Ames & Cunradi, 2004). Furthermore, in the U.S. military, most members perceive the military culture as supportive of drinking (68%), while only a few members felt their supervisor strongly discouraged alcohol consumption (19%; RAND, 2018), suggesting that the culture is alcohol-permissive. Additionally, within the CAF, each of the elements (i.e., Navy, Army, Air Force, and Special Operations) has its own sub-culture and, presumably, drinking sub-culture. The dearth of research in the CAF in this area renders it worthy of additional exploration.

The impact of the CAF's drinking culture could be assessed longitudinally by comparing the baseline results provided by the Recruit Health Questionnaire to additional results at numerous points post-enrollment (e.g., a longitudinal sequential cohort design; Lyons & Kuron, 2014; Twenge et al., 2010). This research could assess the SSAC model at multiple periods, following the same CAF participants for many years. Also, following the work of Smith and colleagues (2014) and Jacobson and colleagues (2008), changes in drinking patterns, mental health disorders, and their influence on one another should be examined longitudinally (e.g., in past research, members with new-onset mental disorders were two to three times more likely to newly report hazardous drinking). Although drinking patterns have been associated with health and well-being within the CAF (Richer, Lee, & Born, 2016), they have not yet been examined longitudinally.

**Generational differences.** While it was assumed that a permissive alcohol attitude and a work-hard-play-hard military drinking culture contributed to the high levels of alcohol consumption in Late Baby Boomers, this was not explicitly examined and warrants future examination. Because Late Baby Boomers tend to be at higher ranks than

younger generations, this generation continues to influence the CAF's alcohol culture today, and this may also merit further examination.

With respect to generational differences, both studies were subject to an insufficient representation of generations and unequal generation groups. Future research should include more evenly distributed generations and large group sizes. This would likely provide more insight into generational differences in alcohol consumption and the SSAC model. In particular, the youngest generation—iGens—warrants examination in relation to alcohol consumption, as it makes up a considerable amount of Canada's population (16.5%; Statistics Canada, 2015) and will continue to grow. Today, there is likely a greater representation of iGens in the Recruit Health Questionnaire data than when data for this thesis was collected.

Additional research is needed to understand the CAF's drinking culture in relation to generation. This would be facilitated by a sequential cohort design that would permit the sequential assessment of generations across their careers (Lyons & Kuron, 2014; Twenge et al., 2010). Further, research conducted on the CAF population, as opposed to a relatively small post-deployment sample, would ensure a more representative sample of Late Baby Boomers, who might be at the greatest risk for alcohol consumption.

**SSAC model improvements.** Moreover, improvements could be made to the SSAC model to better explain alcohol consumption. Other indicators of strain may be more strongly related to Combat Exposure and alcohol consumption (e.g., only 4% of variance in Depression was accounted for in the post-deployment SSAC model). This includes somatic symptoms (e.g., dizziness, headaches, pains in one's stomach, back, arms, legs, joints, etc.; Kroenke et al., 2001) that have been associated post-deployment

with PTSD, depression, health-related quality of life (St. Cyr, McIntyre-Smith, Contractor, Elhai, & Richardson, 2014), and post-concussive symptoms among CAF members post-deployment (Lee, Garber, & Zamorski, 2015). In addition, the associations between Depression and PTSD were strong post-enrollment and even stronger post-deployment. This not only supports research about their comorbidity (Basile et al., 2004; Burnett-Zeigler et al., 2011; Kessler et al., 1995; Pietrzak et al., 2011), but also suggests a direct pathway between them.

The reasons why two individuals with seemingly similar backgrounds (e.g., military members with the same training, some combat experiences and tours) may react in opposite ways when faced with the same stressors are commonly of interest in research on stress. A number of individual characteristics which have been found to play a role (Lazarus, 1991; Pearlin et al., 1981) could be considered in future work, above and beyond the environmental characteristics that were examined here (e.g., combat, traumatic events in life, violent attacks). Psychosocial resources have been found to influence—either by buffering or exacerbating—reactions to stressors (e.g., social support, hardiness, resiliency; Bartone & Adler, 1999; Currier et al., 2014; Seeman & Seeman, 1992; Sudom et al., 2014). In addition, individual differences in coping styles have been associated with differences in alcohol consumption, with individuals who are avoidant being more prone to use alcohol as a coping strategy in response to stressors (over those who use problem-solving coping; Copper et al., 1992). Both psychosocial resources and coping styles could contribute to understanding alcohol consumption.

In the end, more research is needed to generate a more thorough picture of the pathways leading to alcohol consumption. As the goals of these studies were to assess a

SSAC model to explain alcohol consumption, the focus was on the pathways. Further examination of individual changes in alcohol consumption and strain will provide a better understanding of the interrelations of stressors, strain, and alcohol consumption based on differences between those who improved, those who remained the same, and those who experienced greater alcohol consumption and/or strain symptoms. While path analysis in SEM permits the testing of the SSAC model in its entirety, an alternative method, such as examining differences in outcomes based on drinking patterns would provide additional, important information.

### **Conclusion**

Together, these studies demonstrate that alcohol consumption remains a justifiable concern for CAF leaders, who are committed to caring for their members. The high-risk nature of military employment is attributable to several factors, ranging from the dangerous nature of combat to the alcohol-permissive culture of the military, which, together, highlight the need to examine relations between stressors, strain, and alcohol consumption. Combined, results of both studies confirm the common precept that predicting alcohol consumption is challenging due to the multiple factors that influence alcohol consumption. Nonetheless, the results of this thesis elucidated the pathways involved in alcohol consumption. Knowledge about which stressors influence increased alcohol consumption (i.e., negative life events, violence, and childhood adversity) has the potential to ameliorate interventions that could assist CAF members to reduce their alcohol consumption. Further insight into the mediating role of strain, especially PTSD, suggests that it is the reaction to the stressors versus the stressors themselves that contributes to increased alcohol consumption in both post-enrollment and post-

deployment contexts. The results of both studies identify risk factors for alcohol consumption and emphasize that a reduction in strain will subsequently reduce the likelihood of alcohol consumption. Furthermore, as the effects of Afghanistan on CAF members are now just being fully realized, this post-deployment SSAC model provides insight into the effects of Combat Exposure and strain on post-deployment alcohol consumption in the short-term following their return, at least.

Moreover, both younger and older generations—Millennials and Late Baby Boomers—require monitoring and tailored interventions to reduce alcohol consumption. These studies contribute to our understanding of generational differences in alcohol consumption and provide guidance about interventions that might be best tailored to each generation. There has been a dearth of research on generational differences in SSAC models. Although the results do not negate the negative association between alcohol consumption and age, they provide suggestive insights into differences in how generations may react to stressors and strain.

As noted previously, the use of alcohol is prolific in Canadian society and more so in the military. As such, the challenge remains of curbing a socially accepted, and sometimes encouraged, behaviour of drinking to relieve stress. It is not surprising that Canada's allied militaries are dealing with the same struggle. These studies explicate the severity of the problem within the CAF by indicating that at least a quarter of the CAF members are engaging in hazardous and harmful drinking behaviours, and that these negative drinking behaviours can be further influenced by negative and traumatic events experienced prior to enrolling, challenging and trauma-provoking combat experiences during deployment, and, more so, members' reaction to these cumulative events through

strain. Accordingly, results of these studies provide information that can be used to guide the efforts to ameliorate the negative influence of strain and stressors on alcohol use.

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*Appendix A Generational Cohorts Defined Differently*

<b>Author</b>	<b>iGeneration 1996 to 2010</b>	<b>Millennials 1980 to 1995</b>	<b>GenX 1967 to 1979</b>	<b>Late Baby Boomer 1953 to 1966</b>	<b>Early Baby Boomer 1946 to 1952</b>		
<b>Foot (1996, 1998)</b>	<b>Millennials</b> 1996-2010	<b>Baby-Boom- echoers</b> 1980-1995	<b>Baby-buster</b> 1967-1979	<b>Baby Boomers or Generation X</b> 1947-1966		<b>WWII</b> 1940- 1946	<b>Depression Babies</b> 1930-1939
<b>Markus (2014)<sup>12</sup></b>	<b>Millennial</b> 1981+		<b>GenX</b> 1961-1980	<b>Late Baby Boomer</b> 1953-1960	<b>Early Baby Boomer</b> 1946-1952		
<b>Debevec et al (2013)</b>	<b>Younger Millennials</b> 1985+	<b>Older Millennials</b> 1979-1984	<b>Generation X</b> 1965-1979	<b>Trailing- edge Baby Boomer</b> 1955-1965	<b>Leading- edge Baby Boomer</b> 1946-1954	<b>Postwar</b> 1928- 1945	<b>WWII</b> 1922-1927
<b>Zemke et al. (2013)</b>		<b>Millennials</b> 1980-2000	<b>Gen Xers</b> 1960-1980	<b>Baby Boomers</b> 1943-1960			
<b>Murphy (2011)</b>		<b>Millennials</b> 1980+	<b>Gen Xers</b> 1965-1979	<b>Baby Boomers</b> 1946-1966			
<b>Howe &amp; Strauss (2000); Keeling (2003)</b>		<b>Millennials</b> 1982-2003	<b>Generation X</b> 1961-1981	<b>Baby Boomers</b> 1943-1960			<b>Silent</b> 1925-1942

<sup>12</sup> Although Markus (2014) asked demographic questions to identify early/late Baby Boomers, analyses were only conducted on the generation of Baby Boomers having merged the two generations.

<b>Cennamo &amp; Gardner (2008)</b>	<b>Gen Y</b>		<b>Generation X</b>	<b>Baby Boomers</b>		
	1980-2000		1962-1979	1946-1961		
<b>Alsop (2008)</b>	<b>Millennials</b>					
	1992-2002					
<b>Twenge (2010)</b>	<b>Millennials/Generation Y/Gen Me</b>		<b>Gen X/Baby-Bust</b>	<b>Baby Boomers</b>		
	1982 and up		1965-1981	1946-1964		
<b>Tapscott (2009)</b>	<b>Next Generation</b>	<b>Net Generation</b>	<b>Gen X/Baby-Bust</b>	<b>Baby Boomers</b>		
	1998 to present	1977 to 1997	1965-1976	1946-1964		
<b>Lyons et al. (2007)</b>	<b>Millennials</b>		<b>Generation X</b>	<b>Baby Boomers</b>	<b>Matures</b>	
	1980 and up		1965-1979	1945-1964	1945 or earlier	
<b>Mitchell, (2010)</b>	<b>iGeneration</b>	<b>Millennials</b>	<b>Generation X/Xers</b>	<b>Baby Boomers</b>	<b>Swing Generation</b>	<b>WWII</b>
	1995 to present	1977-1994	1965-1976	1946-1964	1933-1945	Before 1933

### Appendix B Recruit Health Questionnaire

As per the agreement between the author and the CAF, Director General Health Services, only survey data directly related to the thesis hypotheses was provided. Appropriately, only the Recruit Health Questionnaire items representing the data are presented herein. Eight sections are included, all of which represent scales, except for Alcohol Consumption, which is a composite of items from different sources.

#### Demographic Questions

1. **What is your date of birth? DD/MM/YYYY**

2. **What is your sex?**

1 Male  2 Female

3. **Are you a Recruit or Officer Cadet?**

1 Recruit  2 Officer Cadet

4. **What is today's date? DD/MM/YYYY**

5. **What is your current marital status?<sup>13</sup>**

Married  Widowed  Divorced  
 Living with a partner  Separated  Single - Never married

6. **What is the highest level of education that you have ever completed?**

Some secondary or high school  Completed secondary or high school or equivalency  
 Some community, tech, college, CEGEP  Completed community/tech college/CEGEP  
 Some university courses  Completed university degree  
 Post graduate studies

7. **During the past year, about how much money (in Canadian dollars), before taxes and deductions, was earned by your entire family living in your home?**

Less than \$20,000  \$20,000 to \$49,999  Don't know  
 \$50,000 to \$100,000  More than \$100,000

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<sup>13</sup> Marital status data was received in only 3 categories 1 (*divorced, single*), 2 (*married living with a partner*), and 3 (*widowed, separated*).

**Alcohol Consumption**

**NOTE: IN THE FOLLOWING QUESTIONS THE WORD "DRINK" REFERS TO:**

- \* ONE BOTTLE OR CAN OF BEER OR GLASS OF DRAFT
- \* ONE GLASS OF WINE OR ONE WINE COOLER
- \* ONE DRINK OR COCKTAIL WITH 1½ OUNCES OF LIQUOR

**8. During the past 12 months, how often did you drink alcoholic beverages? (CHECK ONE ONLY)?**

- Never Go to Question 9    
  2-3 times a week    
  2-3 times a month  
 Once a week    
  Once a month    
  Every day  
 Less than once a month    
  4-6 times a week

**9. How often in the past 12 months have you had 5 or more drinks on one occasion?**

- Never    
  Less than once a month    
  Once a month  
 2-3 times a month    
  Once week    
  More than once a week

**10. Prior to recruit training, in a typical week, how many alcoholic drinks did you have on each day?**

<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>	<b>Saturday</b>	<b>Sunday</b>	

**11. How often during the last year:**

		Never	Less than Monthly	Monthly	Weekly	Daily or almost daily
a	Have you found that you were unable to stop drinking once you had started?	<input type="radio"/>				
b	Have you failed to do what was normally expected from you because of drinking?	<input type="radio"/>				
c	Have you needed a first drink in the morning to get yourself going after a heavy drinking session?	<input type="radio"/>				
d	Have you had a feeling of guilt or remorse after drinking?	<input type="radio"/>				
e	Have you been unable to remember what happened the night before because you had been drinking?	<input type="radio"/>				

**Depression (PHQ-9)**

12. In the past 2 weeks prior to starting recruit training, how often were you bothered by:

		Not at all	Several days	More than half the days	Nearly every day
a	Little interest or pleasure in doing things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b	Feeling down, depressed, or hopeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c	Trouble falling or staying asleep, or sleeping too much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d	Feeling tired or having little energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e	Poor appetite or overeating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f	Feeling bad about yourself, or that you are a failure, or have let yourself or your family down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g	Trouble concentrating on things, such as reading the newspaper or watching television	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h	Moving or speaking so slowly that other people could have noticed. Or the opposite, being so fidgety and restless that you have been moving around a lot more than usual.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i	Thoughts that you would be better off dead, or of hurting yourself in some way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Other Anxiety Disorders (PHQ-7)**

13. Over the last 4 weeks, how often have you been bothered by the following problems?

		Not at all	Several days	More than half the days	Nearly every day
a	Feeling nervous, anxious, on edge or worrying a lot about different things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>If you checked "Not at all," go to the next question</i>					
b	Feeling restless so that it is hard to sit still	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c	Getting tired very easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d	Muscle tension, aches, soreness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e	Trouble falling asleep or staying asleep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f	Trouble concentrating on things, such as reading the newspaper or watching television	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g	Becoming easily annoyed or irritated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**PTSD (PCL-C)**

**14. Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, then indicate how much you have been bothered by that problem in the past month?**

	Not at all	A little bit	Moderately	Quite a bit	Extremely
a. Repeated, disturbing <i>memories, thoughts, or images</i> of a stressful experience from the past?	<input type="radio"/>				
b. Repeated, disturbing <i>dreams</i> of a stressful experience from the past?	<input type="radio"/>				
c. Suddenly <i>acting or feeling</i> as if a stressful experience were <i>happening again</i> (as if you were reliving it)?	<input type="radio"/>				
d. Feeling <i>very upset</i> when <i>something reminded</i> you of a stressful experience from the past?	<input type="radio"/>				
e. Having <i>physical reactions</i> (e.g., heart pounding, trouble breathing, or sweating) when <i>something reminded</i> you of a stressful experience from the past?	<input type="radio"/>				
f. Avoid <i>thinking about or talking about</i> a stressful experience from the past or avoid <i>having feelings</i> related to it?	<input type="radio"/>				
g. Avoid <i>activities or situations</i> because <i>they remind you</i> of a stressful experience from the past?	<input type="radio"/>				
h. Trouble <i>remembering important parts</i> of a stressful experience from the past?	<input type="radio"/>				
i. Loss of <i>interest in things that you used to enjoy</i> ?	<input type="radio"/>				
j. Feeling <i>distant or cut off</i> from other people?	<input type="radio"/>				
k. Feeling <i>emotionally numb</i> or being unable to have loving feelings for those close to you?	<input type="radio"/>				
l. Feeling as if your <i>future</i> will somehow be <i>cut short</i> ?	<input type="radio"/>				
m. Trouble <i>falling or staying asleep</i> ?	<input type="radio"/>				
n. Feeling <i>irritable</i> or having <i>angry outbursts</i> ?	<input type="radio"/>				
o. Having <i>difficulty concentrating</i> ?	<input type="radio"/>				
p. Being " <i>super alert</i> " or watchful or on guard?	<input type="radio"/>				
q. Feeling <i>jumpy</i> or easily startled?	<input type="radio"/>				

The following two sets of questions ask about personal experiences that may make you feel uncomfortable. If you need to talk about these, please discuss this with the staff member later. There is help available through the recruit training medical facilities.

### Adverse Childhood Experiences

15. The following are statements about you when you were growing up, before you were 17 years old. Please choose the ONE answer that comes closest to the way you felt?

		Never	Rarely true	Sometimes true	Often true	Very often true
a	There was someone to take care of you and protect you.	<input type="radio"/>				
b	You felt loved.	<input type="radio"/>				
		Never	Once/twice	Sometimes	Often	Very often
c	How often did a parent or adult living in your home swear at you, insult you, or put you down?	<input type="radio"/>				
d	How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at you?	<input type="radio"/>				
e	How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at each other?	<input type="radio"/>				
f	How often did an adult ever touch you sexually or try to make you touch them sexually?	<input type="radio"/>				
		Yes	No			
g	Did you live with someone who was depressed or mentally ill?	<input type="radio"/>	<input type="radio"/>			
h	Did you live with someone who was a problem drinker or alcoholic?	<input type="radio"/>	<input type="radio"/>			

### Exposure to Violence

16. Did any of the following events EVER happen to you? (FILL IN YES OR NO)?

		Yes	No
a	You were in an accident where you could have been killed but were not badly hurt.	<input type="radio"/>	<input type="radio"/>
b	You were in an accident where you were injured and had to spend at least one night in a hospital.	<input type="radio"/>	<input type="radio"/>
c	You saw a close family member being badly injured or killed.	<input type="radio"/>	<input type="radio"/>
d	You saw a stranger being badly injured or killed.	<input type="radio"/>	<input type="radio"/>
e	You were seriously attacked, beaten up, or assaulted.	<input type="radio"/>	<input type="radio"/>
f	You were threatened with a knife, gun, club, or other weapon.	<input type="radio"/>	<input type="radio"/>
g	You were raped (someone forced you to have sex when you did not want them to).	<input type="radio"/>	<input type="radio"/>

### Negative Life Events

17. If any of these have happened to you in the past year, fill in the circle next to it (Select all that apply).

<input type="checkbox"/>	<b>WORK OR SCHOOL</b>	<input type="checkbox"/>	<b>FINANCES</b>
<input type="checkbox"/>	failed a course	<input type="checkbox"/>	had major unexpected expense (e.g., car, housing)
<input type="checkbox"/>	expected to work more	<input type="checkbox"/>	decreased income
<input type="checkbox"/>	downgraded or demoted at work	<input type="checkbox"/>	had problems with debts (e.g., credit cards, loans, mortgage)
<input type="checkbox"/>	was fired or laid off	<input type="checkbox"/>	<b>ROMANTIC RELATIONSHIPS</b>
<input type="checkbox"/>	had problems finding a good job	<input type="checkbox"/>	had more arguments with your partner/ spouse/boyfriend or girlfriend
<input type="checkbox"/>	had trouble with boss or coworkers	<input type="checkbox"/>	had sexual difficulties
<input type="checkbox"/>	<b>HEALTH</b>	<input type="checkbox"/>	learned that your boyfriend/girlfriend/ spouse/ partner had been unfaithful
<input type="checkbox"/>	had sudden, serious problems with vision or hearing	<input type="checkbox"/>	had an affair
<input type="checkbox"/>	had significant weight gain	<input type="checkbox"/>	had a breakup of serious relationship
<input type="checkbox"/>	had problems sleeping	<input type="checkbox"/>	boyfriend/girlfriend/spouse/partner had emotional or psychiatric problem, drank heavily or arrested
<input type="checkbox"/>	had surgery	<input type="checkbox"/>	partner was raped/physically attacked or threatened
<input type="checkbox"/>	became pregnant (women only)	<input type="checkbox"/>	<b>HOME, FRIENDS AND FAMILY LIFE</b>
<input type="checkbox"/>	had miscarriage (women only)	<input type="checkbox"/>	close friend moved to another city or area
<input type="checkbox"/>	had abortion (women only)	<input type="checkbox"/>	parents divorced or separated
<input type="checkbox"/>	girlfriend/wife became pregnant (men only)	<input type="checkbox"/>	close family member entered a nursing home
<input type="checkbox"/>	girlfriend/wife had miscarriage	<input type="checkbox"/>	a parent died
<input type="checkbox"/>	girlfriend/wife had an abortion	<input type="checkbox"/>	another close family member died
<input type="checkbox"/>	had serious illness or injury	<input type="checkbox"/>	a friend died
<input type="checkbox"/>	had frequent colds, influenza	<input type="checkbox"/>	family member or friend developed a serious illness or was seriously injured
<input type="checkbox"/>	had a psychiatric or emotional problem	<input type="checkbox"/>	family member or close friend was drinking heavily, suicidal or in prison
<input type="checkbox"/>	was concerned that your partner may have had a sexually transmitted disease	<input type="checkbox"/>	had a quarrel with relative, friend, neighbor or roommate
<input type="checkbox"/>	<b>PERSONL EVENTS</b>	<input type="checkbox"/>	a pet died
<input type="checkbox"/>	was victim of auto accident, fire, flood, vandalism	<input type="checkbox"/>	family member or friend was raped
<input type="checkbox"/>	had your home robbed or car stolen	<input type="checkbox"/>	family member or friend was robbed
<input type="checkbox"/>	was robbed, threatened, or physically assaulted	<input type="checkbox"/>	had a "falling out" with a close personal friend
<input type="checkbox"/>	was raped		
<input type="checkbox"/>	was found guilty of a traffic violation (except a parking ticket)		
<input type="checkbox"/>	was arrested by police		
<input type="checkbox"/>	was convicted of a criminal offence		

Place an "X" in the following box if none of the items in question 17 applied to you:

*Appendix C Comparison of Recruit Health Questionnaire (RHQ) Alcohol Consumption Items and AUDIT Items*

Item #	AUDIT (Babor et al., 2001)	RHQ	Mapping RHQ to AUDIT Items
<b>Defining Alcohol Quantity</b>	One standard drink is Spirits (30 ml), Fortified wine (70 ml), Table wine (100 ml), Regular beer (285 ml) Light beer (480 ml)	In the following questions the word “drink” refers to: (a) one bottle or can of beer or glass of draft; (b) one glass of wine or a wine cooler; and (c) one drink or cocktail with 1 ½ ounce of liquor.	
<b>Hazardous Alcohol Use</b>			
<b>Frequency of drinking</b>	1. How often do you have a drink containing alcohol?	30. During the past 12 months, how often did you drink alcoholic beverages?	RHQ specifies within the last 12 months while AUDIT is vague about timeframe.
	0 ( <i>never</i> )	1 ( <i>never</i> )	RHQ rating of 1 on Item 30 equates to AUDIT rating of 0
	1 ( <i>monthly or less</i> )	2 ( <i>less than once a monthly</i> ) 3 ( <i>once a month</i> )	RHQ rating of 2 & 3 on Item 30 combined would capture AUDIT rating of 1
	2 ( <i>2 to 4 times a month</i> )	4 ( <i>2 – 3 times a month</i> ) 5 ( <i>once a week</i> )	RHQ rating of 4 & 5 on Item 30 combined would capture AUDIT rating of 2
	3 ( <i>2 to 3 times a week</i> )	6 ( <i>2 – 3 times a week</i> )	RHQ rating of 6 on Item 30 equates to AUDIT rating of 3
	4 ( <i>4 or more times a week</i> )	7 ( <i>7 – 6 times a week</i> ) 8 ( <i>every day</i> )	RHQ rating of 7 & 8 on Item 30 combined would capture AUDIT rating of 4

<b>Typical quantity</b>	2. How many drinks containing alcohol do you have on a typical day when you are drinking?	32. Prior to recruit training, in a typical week, how many alcoholic beverages did you have on each day?	The quantity of drinks had on a typical day is estimated by averaging the number of standard drinks consumed across the 7 days of the week.
	0 <sup>14</sup> ( <i>none</i> )	Monday to Sunday with each day-of-the-week having blanks spots to indicate the number of drinks up to two digits	The average number of drinks per day would be then be categorized based on the 5-point Likert-type scale used in AUDIT #2.
	0 ( <i>1 or 2</i> )		0 (0 to 2) averaged scores of 0 to 2.50
	1 ( <i>3 or 4</i> )		1 ( <i>3 or 4</i> ) averaged scores of 2.51 to 4.50
	2 ( <i>5 or 6</i> )		2 ( <i>5 or 6</i> ) averaged scores of 4.51 to 6.50
	3 ( <i>7 to 9</i> )		3 ( <i>7 to 9</i> ) averaged scores of 6.51 to 9.50
	4 ( <i>10 or more</i> )		4 ( <i>10 or more</i> ) averaged scores of 9.51 and up
<b>Frequency of heavy drinking</b>	3. How often do you have six or more drinks on one occasion?	31. How often in the past 12 months have you had 5 or more drinks on one occasion?	AUDIT uses 6 or more and Recruit Health Questionnaire uses 5 or more, so Recruit Health Questionnaire has a lower number
	0 ( <i>never</i> )	1 ( <i>never</i> )	RHQ rating of 1 on Item 31

<sup>14</sup> The AUDIT uses a 4-point Likert-type scale for this question ranging from 0 (*1 to 2*) to 4 (*10 or more*; Babor et al., 2001) and the EPDS using a six-point scale ranging from zero (*none*) to 5 (*10 or more*).

	1 ( <i>less than monthly</i> )	2 ( <i>less than once a month</i> )	equates to AUDIT rating of 0 RHQ rating of 2 on Item 31 equates to AUDIT rating of 1
	2 ( <i>monthly</i> )	3 ( <i>once a month</i> ) 4 ( <i>2 – 3 times a month</i> )	RHQ ratings of 3 & 4 on Item 31 will be used as a proxy equal to AUDIT rating of 2
	3 ( <i>weekly</i> )	5 ( <i>Once a week</i> )	RHQ rating of 5 on Item 31 equates to AUDIT rating of 3
	4 ( <i>daily or almost daily</i> )	6 ( <i>more than once a week</i> )	RHQ rating of 6 on Item 31 would be used as a proxy equal to AUDIT rating of 4
<b>Dependence Symptoms</b>			
<b>Impaired control over drinking</b>	4. How often during the last year have you found that you were not able to stop drinking once you started?	33a. How often during the last year have you found that you were not able to stop drinking once you started?	Both surveys have the same item but different 5-point scales, which were recoded from 1 to 5 to 0 to 4.
	0 ( <i>never</i> )	1 ( <i>never</i> )	
	1 ( <i>less than monthly</i> )	2 ( <i>less than monthly</i> )	
	2 ( <i>monthly</i> )	3 ( <i>monthly</i> )	
	3 ( <i>weekly</i> )	4 ( <i>weekly</i> )	
	4 ( <i>daily or almost daily</i> )	5 ( <i>daily or almost daily</i> )	
<b>Increased salience drinking</b>	5. How often during the last year have you failed to do what was normally expected of you because of drinking?	33b. How often during the last year have you failed to do what was normally expected of you because of drinking?	Both surveys have the same item but different 5-point scales, which were recoded from 1 to 5 to 0 to 4.
	0 ( <i>never</i> )	1 ( <i>never</i> )	
	1 ( <i>less than monthly</i> )	2 ( <i>less than monthly</i> )	
	2 ( <i>monthly</i> )	3 ( <i>monthly</i> )	

	3 ( <i>weekly</i> )	4 ( <i>weekly</i> )	
	4 ( <i>daily or almost daily</i> )	5 ( <i>daily or almost daily</i> )	
<b>Morning drinking</b>	6. How often during the last year have you needed a drink in the morning to get yourself going after a heavy drinking session?	33c. How often during the last year have you needed a drink in the morning to get yourself going after a heavy drinking session?	Both surveys have the same item but different 5-point scales, which were recoded from 1 to 5 to 0 to 4.
	0 ( <i>never</i> )	1 ( <i>never</i> )	
	1 ( <i>less than monthly</i> )	2 ( <i>less than monthly</i> )	
	2 ( <i>monthly</i> )	3 ( <i>monthly</i> )	
	3 ( <i>weekly</i> )	4 ( <i>weekly</i> )	
	4 ( <i>daily or almost daily</i> )	5 ( <i>daily or almost daily</i> )	
<b>Harmful Alcohol Use</b>			
	7. How often during the last year have you had a feeling of guilt or remorse after drinking?	33d. How often during the last year have you had a feeling of guilt or remorse after drinking?	Both surveys have the same item but different 5-point scales, which were recoded from 1 to 5 to 0 to 4.
	0 ( <i>never</i> )	1 ( <i>never</i> )	
	1 ( <i>less than monthly</i> )	2 ( <i>less than monthly</i> )	
	2 ( <i>monthly</i> )	3 ( <i>monthly</i> )	
	3 ( <i>weekly</i> )	4 ( <i>weekly</i> )	
	4 ( <i>daily or almost daily</i> )	5 ( <i>daily or almost daily</i> )	
	8. How often during the past year have you been unable to remember what happened the night before because you had been drinking?	33e. How often during the past year have you been unable to remember what happened the night before because you had been drinking?	Both surveys have the same item but different 5-point scales, which were recoded from 1 to 5 to 0 to 4.

0 ( <i>never</i> )	1 ( <i>never</i> )	
1 ( <i>less than monthly</i> )	2 ( <i>less than monthly</i> )	
2 ( <i>monthly</i> )	3 ( <i>monthly</i> )	
3 ( <i>weekly</i> )	4 ( <i>weekly</i> )	
4 ( <i>daily or almost daily</i> )	5 ( <i>daily or almost daily</i> )	
9. Have you or someone else been injured as a result of your drinking?	No equivalent in Recruit Health Questionnaire	Future comparisons with AUDIT scores will have to be adjusted to match the RHQ version of the AUDIT because Items #9 and #10 are missing in the RHQ.
0 ( <i>no</i> )		
2 ( <i>yes, but <u>not</u> during the last year</i> )		
4 ( <i>yes, during the last year</i> )		
10. Has a relative, friend, doctor, or other health professional been concerned about your drinking or suggested you should cut down?	No equivalent in Recruit Health Questionnaire	
0 ( <i>no</i> )		
2 ( <i>yes, but <u>not</u> during the last year</i> )		
4 ( <i>yes, during the last year</i> )		

*Appendix D Enhanced Post-Deployment Screening Questionnaire Booklet*

The following items are from the Enhanced Post-Deployment Screening Questionnaire Booklet and represent only those items related to this thesis as per the agreement between the author and the CAF, Director General Health Services. Only those items representing the data are presented herein. Six sections are included, all of which represent scales with the exception on the Demographic Questionnaire.

Demographic Questionnaire

1. **What is your rank?** \_\_\_\_\_
2. **What is your age?** \_\_\_\_\_
3. **What is today's date?** DD/MM/YYYY
4. **Branch of Service:**  
1 Land      2 Sea      3 Air      4 Civilian
5. **Duty Status:**  
1 Regular    2 Reserves   3 Civilian
6. **Number of Previous Deployments (excluding most recent one); include domestic operations such as the Winnipeg flood, Ontario/Quebec ice storm, and the Swissair crash. (If you have not deployed before, please enter "00")**  

Number of previous		
--------------------	--	--
7. **Marital Status:**<sup>15</sup>  
1 Married/living with partner      4 Separated  
2 Divorced                              5 Widowed  
3 Single (never married)
8. **What is your sex?**  
1 Male                                      2 Female
9. **What is the highest level of education that you have ever completed (excludes military trades training)?**  
1 High School or less  
2 More than High School but less than University  
3 University degree
10. **What was your approximate total household income\* for the previous tax year before income tax deduction? (please mark the appropriate box below—your best guess is just fine)**  
1 \$59K or less  
2 \$60K to \$99K  
3 \$100K or more  
8 Don't know

\*Household income is defined as any income received for all of the people living with you, including: wages and salaries, other income sources such as self-employment, unemployment insurance, worker's compensation, retirement income, interest and dividends on bonds, deposits, savings, and other investments.

<sup>15</sup> Data from this item was recoded to 1 (divorced and single [never married]) to 2 (married/living with partner) and 3 (separated and widowed) prior to being given to the author.

## Depression (PHQ-9)

*This questionnaire is an important part of providing you with the best health care possible. Your answers will help in understanding problems that you may have. Please answer every question to the best of your ability unless you are requested to skip a question.*

Over the last 2 weeks, how often have you been bothered by any of the following problems?

		Not at all	Several days	More than half the days	Nearly every day
1	Little interest or pleasure in doing things	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
2	Feeling down, depressed, or hopeless	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
3	Trouble falling or staying asleep, or sleeping too much	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
4	Feeling tired or having little energy	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
5	Poor appetite or overeating	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
6	Feeling bad about yourself, or that you are a failure, or have let yourself or your family down	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
7	Trouble concentrating on things, such as reading the newspaper or watching television	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
8	Moving or speaking so slowly that other people could have noticed. Or the opposite, being so fidgety and restless that you have been moving around a lot more than usual.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
9	Thoughts that you would be better off dead, or of hurting yourself in some way	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

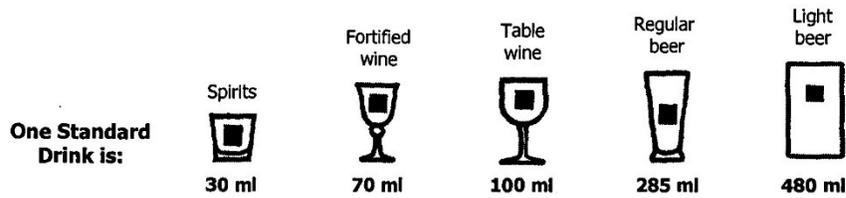
## Other Anxiety Disorders (PHQ-7)

Over the last 4 weeks, how often have you been bothered by the following problems?

		Not at all	Several days	More than half the days	Nearly every day
1	Feeling nervous, anxious, on edge or worrying a lot about different things	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
<b>If you checked "Not at all," go to the next question</b>					
2	Feeling restless so that it is hard to sit still	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
3	Getting tired very easily	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
4	Muscle tension, aches, soreness	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
5	Trouble falling asleep or staying asleep	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
6	Trouble concentrating on things, such as reading the newspaper or watching television	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
7	Becoming easily annoyed or irritated	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

AUDIT

**The following questions relate to alcohol use. Please check the box that best corresponds to your answer. PLEASE ANSWER ALL QUESTIONS—EVEN IF YOU DO NOT CURRENTLY DRINK ALCOHOL.**



1. How often do you have a drink containing alcohol?
 

never <input type="checkbox"/> 1	monthly or less <input type="checkbox"/> 2	2 to 4 times a month <input type="checkbox"/> 3	2 to 3 times a week <input type="checkbox"/> 4	4 or more times a week <input type="checkbox"/> 5
-------------------------------------	---	--	---	--
  
2. How many drinks containing alcohol do you have on a typical day when you are drinking?
 

none <input type="checkbox"/> 0	1 or 2 <input type="checkbox"/> 1	3 or 4 <input type="checkbox"/> 2	5 or 6 <input type="checkbox"/> 3	7 to 9 <input type="checkbox"/> 4	10 or more <input type="checkbox"/> 5
------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--

		Less than monthly	Monthly	Weekly	Daily or almost daily
3. How often do you have six or more drinks on one occasion?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. How often during the last year have you found that you were not able to stop drinking once you had started?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. How often during the last year have you failed to do what was normally expected of you because of drinking?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. How often during the last year have you needed a drink in the morning to get yourself going after a heavy drinking session?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. How often during the last year have you had a feeling of guilt or remorse after drinking?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. How often during the past year have you been unable to remember what happened the night before because you had been drinking?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

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

No <input type="checkbox"/> 1	Yes, but <u>not</u> during the last year <input type="checkbox"/> 2	Yes, during the last year <input type="checkbox"/> 3
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**10. Has a relative, friend, a doctor, or other health professional been concerned about your drinking or suggested you should cut down?**

- No 1
- Yes, but not during the last year 2
- Yes, during the last year 3

**PTSD (PCL-C<sup>16</sup>)**

*Below is a list of problems and complaints that service members and veterans sometimes have in response to stressful life experiences. Please read each one carefully, put an "X" in the box to indicate how much you have been bothered by that problem in the last month.*

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing <i>memories, thoughts</i> , or <i>images</i> of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2. Repeated, disturbing <i>dreams</i> of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were <i>happening again</i> (as if you were reliving it)?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. Feeling very <i>upset</i> when <i>something reminded</i> you of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. Having <i>physical reactions</i> (e.g., heart pounding, trouble breathing, or sweating) when <i>something reminded</i> you of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. Avoid <i>thinking about</i> or <i>talking about</i> a stressful experience from the past or avoid <i>having feelings</i> related to it?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. Avoid <i>activities</i> or <i>situations</i> because <i>they remind you</i> of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. Trouble <i>remembering important parts</i> of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. Loss of <i>interest in things that you used to enjoy</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10. Feeling <i>distant</i> or <i>cut off</i> from other people?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11. Feeling <i>emotionally numb</i> or being unable to have loving feelings for those close to you?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
12. Feeling as if your <i>future</i> will somehow be <i>cut short</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
13. Trouble <i>falling</i> or <i>staying asleep</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
14. Feeling <i>irritable</i> or having <i>angry outbursts</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15. Having <i>difficulty concentrating</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

<sup>16</sup> PCL-C © 1991, National Center for PTSD (USA). Labelled PCL-C in survey.

16. Being " <i>super alert</i> " or watchful or on guard?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
17. Feeling <i>jumpy</i> or easily startled?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

### Combat Exposure<sup>17</sup>

During <b>your most recent deployment</b> , did you experience:	NO	YES
1. Being attacked or ambushed	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
2. Receiving small arms fire	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
3. Seeing dead bodies or human remains	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
4. Handling or uncovering human remains	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
5. Witnessing an accident which resulted in serious injury or death	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
6. Seeing dead or seriously injured Canadians	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
7. Knowing someone seriously injured or killed	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
8. Improvised explosive device (IED)/booby trap exploded near you	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
9. Working in areas that were mined or had IEDs	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
10. Having hostile reactions from civilians	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
11. Being in threatening situations where you were unable to respond because of rules of engagement	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
12. Shooting or directing fire at the enemy	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
13. Calling in fire on the enemy	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
14. Engaging in hand-to-hand combat	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
15. Clearing/searching homes or buildings	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
16. Clearing/searching caves or bunkers	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
17. Being wounded/injured	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
18. Seeing ill/injured women or children who you were unable to help	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
19. Receiving incoming artillery, rocket, or mortar fire	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
20. Feeling directly responsible for the death of an enemy combatant	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
21. Feeling directly responsible for the death of a non-combatant	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
22. Witnessing a friendly fire incident	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
23. Feeling responsible for the death of Canadian or ally personnel	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
24. Having a member of your own unit become a casualty	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
25. Had a close call, was shot or hit but protective gear saved you		
26. Had a buddy shot or hit who was near you	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
27. Having difficulty distinguishing between combatants and noncombatants	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
28. Participating in IED/mine clearing	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
29. Sniper fire	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>
30. Seeing a unit member blown up or burned alive	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>

<sup>17</sup> Adapted from the US Army's Walter Reed Army Institute for Research Combat Exposure Scale. Titled "Deployment Exercises" in the survey itself.