INVESTIGATING THE ROLES OF EXECUTIVE FUNCTIONING AND SELF-REGULATION IN GAMBLING

by

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The purpose of this study was to investigate a self-regulation model of gambling in which the mood regulation function of gambling was examined in the context of deficits in executive functioning and mood dysregulation. It was predicted that deficits in executive dysfunction would be associated with increased emotion regulation difficulties, greater use of gambling to regulate emotions and, in turn, more problematic gambling patterns, particularly during states of increased negative affect. To test this hypothesis, two research questions were investigated. The first question used path analysis to evaluate direct and indirect relationships between executive dysfunction, emotion dysregulation, gambling motives (coping and enhancement), and gambling frequency and problems. Difficulties in executive functioning was associated with emotion dysregulation, which in turn was associated with both coping and enhancement motives. In addition, emotion dysregulation mediated the relationship between executive dysfunction and these motives. In terms of gambling motives, enhancement motives mediated the relationship between emotion dysregulation and gambling behaviour and problems, whereas coping motives mediated the relationship between emotion dysregulation and gambling problems only. In addition, the relationship between coping motives and gambling problems was stronger than enhancement motives-gambling relationship. Regarding the second research question, a mood induction was used to prospectively examine whether mood condition (i.e., negative mood versus
positive mood state) moderated the indirect relationship between executive dysfunction and mood-related gambling expectancies through emotion dysregulation. Although mood condition was not a moderator, additional exploratory analyses focusing on high versus low negative mood states revealed that the mediating effect of emotion dysregulation on the relationship between executive dysfunction and relief-related gambling expectancies (but not reward-related gambling expectancies) was greater at higher levels of negative mood. Overall, the results support a model of gambling that highlights negative affect as a critical component for understanding how and when deficits in executive functioning and emotion regulation contribute to greater risk of gambling problems. Impairments in the capacity to effectively manage negative emotions may be instrumental for building relief-related gambling cognitions and motivating problematic gambling behaviours. Findings have important implications for gambling theory as well as for prevention and treatment strategies for problematic gambling.
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With the modern expansion of gambling venues, as well as online and electronic gambling opportunities in Ontario and the nation at large, gambling has become a significant national health issue, with 2.2 million Canadians estimated to be at risk for experiencing a problem with gambling (Wood & Williams, 2009). Furthermore, it has been estimated that 1.1 million Canadians struggle with moderate to severe problem gambling (Wood & Williams, 2009). Individuals with problem gambling experience a range of negative consequences due to their excessive gambling, including employment issues, financial instability, dysfunctional relationships, anxiety and depression, suicidal ideation, health problems, and substance use issues (Marshall & Wynne, 2003; Statistics Canada, 2003; Smith, 2014; Williams, Rehm, & Stevens, 2011). In terms of negative financial consequences, 60-80% of individuals with problem gambling often risk more money than they intend to risk and spend more money than they can afford to lose on gambling (Marshall & Wynne, 2003). Studies have shown that individuals with gambling-related financial issues were more likely to borrow money, engage in additional gambling, lie about their activities, default on debts, and engage in criminal behaviour in order to address states of financial peril caused by gambling (Marshall & Wynne, 2003; Rickets & Mackaskill, 2003; Williams et al., 2011). Individuals with problem gambling are also more likely to have strained or damaged relationships with their friends and family members than low-risk gamblers (Marshall & Wynne, 2003; Rickets & Mackaskill, 2003; Williams et al., 2015). The emotional and physical health costs associated with gambling problems, such as financial instability and interpersonal conflict, are also severe and involve feelings of depression, guilt, anger, and loss of self-confidence (Rickets & Mackaskill, 2003; Williams et al., 2015). Moreover, it has been shown that problem gamblers experience high to extreme
levels of stress and poorer overall health than low-risk gamblers (Marshall & Wynne, 2003; Rickets & Mackaskill, 2003). The widespread prevalence and harmful outcomes of gambling are clear and more research is required to understand the factors that contribute to the development of gambling difficulties.

Gambling is defined as the placement of value on an event that has the possibility of resulting in a larger and more beneficial outcome (Petry, 2005). As such, gambling inherently involves an element of risk given that random chance governs the outcome. Specifically, gambling behaviour involves betting on games and activities, such as cards (e.g., poker, blackjack), table games (e.g., Russian Roulette), slot machines, lotteries and instant scratch tickets, bingo, dice, races, sporting events, raffles, and skill-based games (e.g., pool, darts). Gambling is widely considered an addictive behaviour given its potential to reach both problematic and pathological levels. Pathological gambling however, falls under the category of event-based addictions or behavioural addictions, which are distinguished from substance-based addictions (e.g., alcohol dependence). Indeed, pathological gambling has been referred to as the “purest addiction” due to the fact that external substances do not enter the biological system (Custer, 1982). Although pathological gambling was previously considered a disorder of impulse control (APA, 2000), revisions to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5; APA, 2013) have re-classified pathological gambling under the category of Addictions along with substance-use disorders. Furthermore, pathological gambling is the only behavioural addiction considered in the DSM-5 (APA, 2013). The phenomenon of problem gambling serves as an important platform for examining psychological mechanisms that underlie the development and maintenance of addictive behaviours.
There are a number of complex and interacting genetic, social, and psychological factors involved in the development of problem gambling. One of the factors that has received attention in the research literature involves the psychological process of self-regulation. Indeed, there is ample evidence to suggest that self-regulation is an important factor to consider in models of problem gambling (Baumeister, Heatherton, & Tice, 1994; Blaszczynski & Nower, 2002; Brown, 2008; Ciarrocchi, 2002; Garay-Kofeldt, 2012; Weatherly & Miller, 2013), although there are several aspects of the relationship between problem gambling and self-regulation that have not yet been explored. The current study will examine how aspects of self-regulation influence the development of harmful gambling.

**Self-regulation**

Broadly speaking, the term self-regulation refers to the “exercise of control over oneself” (Vohs & Baumeister, 2004, p. 2), particularly with regards to bringing “the self in line with preferred (thus, regular) standards” (Vohs & Baumeister, 2004, p. 2). From a biological perspective, self-regulation refers to physiological homeostasis, which, for example, allows the body to maintain a constant temperature. From a psychological perspective, self-regulation involves the regulation of the self by the self and not just regulation of the self. Self-regulation involves a range of processes that enable individuals to regulate their thoughts, emotions, behaviours, impulses, and attentional processes. There is much overlap between the terms self-regulation and self-control; however, they can be differentiated. Self-regulation is considered to be a broader concept that includes any type of goal-directed behaviour. Self-control, on the other hand, is thought to be an aspect of self-regulation that reflects conscious impulse control (Vohs & Baumeister, 2004). Historically, theorists and researchers posited self-regulation to be comprised of conscious and deliberate efforts, however new evidence has suggested that
automatic and nonconscious processes also play an important role in self-regulatory mechanisms (Muraven & Baumeister, 2000; Vohs & Baumeister, 2004).

Effective self-regulation is thought to consist of six mechanisms: goal setting, activation and use of goals, self-monitoring, discrepancy detection, implementation of discrepancy-reduction skills, and self-efficacy (Baumeister et al., 1994; Ciarrocchi, 2002; Karoly, 1993).

Goal setting involves the ability to identify and define adaptive personal goals and desired outcomes that guide attention to appropriate aspects of behaviour and serve as a basis for self-evaluation. Individuals must activate and utilize their goals in order to regulate their behaviour towards a desired outcome; this requires individuals to have cognitive awareness of their goals. Self-monitoring refers to the ongoing tracking of thoughts, feelings, and behaviours in relation to goals (Sayette, 2004). In order to engage in effective self-regulation, it is important for individuals to notice any discrepancies between their behaviours and their goals and respond by engaging in strategies to reduce discrepancies, as differences between behaviours and goals typically give rise to states of negative affect (Ciarrocchi, 2002; Karoly, 1993). Examples of discrepancy reduction strategies include figuring out why there is a discrepancy, engaging in planning, problem solving, changing behaviour, and changing environmental situations (Brown, 2008; Carver & Scheier, 1998; Ciarrocchi, 2002; Karoly, 1993).

Self-regulation processes are important to maintaining healthy gambling behaviour by enabling individuals to set reasonable standards for their gambling behaviour and to track their actions in relation to their goals for gambling (Brown, 2008; Ciarrocchi, 2002). Once a gambling-related goal or limit has been cognitively set and activated (e.g., not to risk more than $50 during a gambling session), individuals will then evaluate their thoughts and behaviours with respect to their goals (Brown, 2008; Carver & Scheier, 1998; Ciarrocchi, 2002; Karoly,
If gambling related behaviours are found to be discrepant in comparison to these goals, individuals may self-regulate in order to alter their gambling behaviours and re-align with their previously set goals (e.g., if individuals begin to entertain thoughts about spending more than their pre-determined amount of $50, they may then inhibit or control themselves from engaging in further gambling activity in order to stick to their goal).

Despite establishing pre-set gambling limits as well as intentions to adhere to these limits, self-regulation attempts are not always successful. Indeed, individuals often undermine their own gambling-related goals, which may occur through spending more money and/or time on gambling than initially planned, and subsequently they may experience feelings of guilt around their excessive gambling (Ladouceur & Lalande, 2011). As a result, this may lead to the phenomenon of chasing to attempt to recover gambling related losses (APA, 2013).

**Failures in Self-Regulation and Gambling**

Self-regulation failures can be subdivided into failures of *underregulation* and *misregulation* (Baumeister et al., 1994; Ciarrocchi, 2002; Sayette & Griffin, 2011). Both types of self-regulation failures contribute to the development of addictive behaviours (Sayette & Griffin, 2011). Self-regulation failures are particularly important when considering the development of gambling problems due to the nature of gambling-related activities, which involve goal-setting (e.g., setting limits on how much to gamble), monitoring wins and losses, identifying whether wins and losses diverge from the original gambling limit, and altering behaviour in light of these wins and losses (Baumeister et al., 1994; Moore, Thomas, Kyrios, & Bates, 2012). Underregulation involves a failure to exert control over oneself in terms of failing to set appropriate goals or standards, self-monitor, identify discrepancies between behaviours and goals, and self-correct emotions, thoughts, and behaviours in relation to goals (Baumeister...
et al., 1994; Sayette, 2004). Difficulties in performing any of these tasks while engaging in gambling could then lead to uncontrolled and maladaptive gambling behaviour. Misregulation involves exerting control in a way that fails to produce the desired result, and may occur through maladaptive self-regulatory processes (Baumeister et al., 1994; Brown, 2008; Ciarrocchi, 2002). Self-regulation in this way could involve engaging in potentially risky activities such as gambling as a means to regulate mood (Baumeister et al., 1994; Brown, 2008; Ciarrocchi, 2002). The tendency to immerse oneself in gambling in order to avoid negative emotions or situations has been linked to addictive patterns of gambling (Jacobs, 1986; Rockloff & Dyer, 2006; Stewart & Zack, 2008). Misregulation can also occur through holding distorted beliefs about one’s level of personal skill and one’s probability of winning during gambling (Baumeister et al., 1994; Blaszczynski & Nower, 2002; Brown, 2008; Ciarrocchi, 2002; Moore & Ohstuka, 1999). These beliefs can contribute to the development of pathological gambling as they lead individuals to think they do not need to control their gambling behaviour (Baumeister et al., 1994; Blaszczynski & Nower, 2002; Moore & Ohstuka, 1999). Distorted beliefs involved in problematic gambling specifically include: belief in luck, where individuals falsely believe they possess a greater amount of luck than others and that luck is a personal attribute that will increase their chances of success in gambling; illusion of control, where individuals believe they possess the skills or ability to control chance events; gamblers’ fallacy, where individuals wrongly believe that an event is less likely to occur if it has already occurred (e.g., gamblers might believe that they are less likely to continue losing if they have already gone through a losing streak); and chasing, where individuals wager increasingly larger amounts of money in order to recoup losses due to the incorrect belief that luck will change and that they will eventually win if they continue to gamble (Brown, 2008; Ciarrocchi, 2002; Darke & Freedman,
Researchers have discovered that it is possible for gamblers to successfully stay within pre-set gambling limits through the use of self-regulation strategies (Moore, Thomas, Kyrios, & Bates, 2012); however, failures in self-regulation are also possible, where individuals may exceed these pre-set gambling limits, particularly in the heat of the moment. Self-regulation failures have been empirically linked to addictive disorders (Hull & Slone, 2004; Sayette & Griffin, 2011) and specifically within the gambling domain, theorists have identified impaired self-control as "the central, diagnostic and foundational feature of pathological gambling" (Blaszczynski & Nower, 2002, p. 488). Previous research has indicated that self-regulation failures are more common for problem gamblers than for non-problem gamblers (Moore et al., 2012; Thomas et al., 2010). Studies investigating the use of gambling-oriented self-regulation strategies (e.g., avoiding gambling-related contexts, reminding oneself of negative consequences of gambling, focusing on other activities or hobbies, or establishing pre-set time or money limits, etc.) have found that although problem gamblers attempted to employ a number of strategies to control their gambling, they were not able to carry out the successful implementation of these strategies, when compared to non-problem gamblers (Moore et al., 2012; Thomas et al., 2010). Furthermore, a study by Lalande and Ladouceur (2011) looked specifically at limit-setting as a self-control strategy for gambling, and found that problem gamblers were more likely to fail at controlling gambling behavior than non-problem gamblers by not adhering to pre-set gambling limits. In addition, these authors noted that violating gambling limits in this manner has been linked to increased gambling-related harm (Blaszczynski, Ladouceur, & Moodie, 2008; Lalande & Ladouceur, 2011).

As described above, the process of self-regulation plays an important role in controlling
gambling and determining gambling outcomes. Further exploration of the factors involved in the link between self-regulation ability and gambling problems is needed to inform our current understanding of theoretical models of gambling problems. One important factor in further understanding the development of gambling problems involves the neural substrates integral to self-regulatory ability (i.e., executive cognitive functioning).

**Executive Functioning and Self-Regulation**

From a cognitive neuroscience perspective, difficulties in the ability to self-regulate that contribute to the development and maintenance of addictive behaviours (including pathological gambling) are reflected by impairments in executive functioning (Sharpe, 2002). Executive functions are cognitive processes integral for organizing information, planning, problem solving, and coordinating thought and action towards goal-directed behaviour and thus facilitate self-regulation and self-control (Blair & Ursache, 2011).

Hofmann, Schmeichel, and Baddeley (2012) posit that executive functions underlie the capacity to self-regulate. These researchers argue that the three basic executive functions - working memory, inhibition, and mental set shifting - support the mechanisms involved in goal directed self-regulatory behaviour, and that these ‘cold’ executive functions are involved in the management of impulses, desires, cravings, and unwanted emotions, all of which are considered ‘hot’ processes. According to this model, working memory enables the active representation of goals, which makes it possible for these representations to be held at the forefront of the mind (Miller & Cohen, 2001). The attentional component of working memory, ‘executive attention’, is crucial for self-regulation as it helps redirect attention away from tempting stimuli by suppressing desire-related thoughts and emotions, allowing goal representations to remain in the forefront of the mind. This process is called ‘goal shielding’ as executive attentional capacities
essentially shield self-regulatory goals from distracting stimuli and competing goals, and shine the spotlight on goal-relevant information (Shah et al., 2002). These findings highlight the integral role that executive functioning plays in facilitating processes of self-regulation. Given that self-regulation is central to understanding patterns of gambling (Baumeister, Heatherton, & Tice, 1994; Ciarrocchi, 2002), this research provides support for understanding executive functioning as a fundamental mechanism underlying the ability to control gambling behaviour.

In a study focusing on the impact of executive functioning on behavioural self-control, Hofmann, Gschwendner, Friese, Wiers, and Schmitt (2008) sought to explore how automatic versus controlled dispositions influence the relationship between individual differences in working memory and control behaviour in tempting situations. These investigators were interested in individual differences reflecting dual-process models of information processing, and referred to automatic dispositions as the tendency to have more spontaneous, impulsive, or hot information attitudes and personality traits, and controlled dispositions as the tendency have more deliberative, reflective, or cool attitudes and personality traits. This study demonstrated that, within a group of participants characterized by automatic dispositions, those with greater working memory abilities were able to refrain from viewing sexual stimuli, eating sweet food, and expressing negative social feedback to a greater extent than those with lower working memory abilities. This effect was paralleled within a group of participants established to have controlled dispositions, in that elevated working memory ability correlated positively with greater self-regulatory behaviour. This study sheds light on the importance of executive functioning, in this case working memory, for guiding self-regulatory behaviour across various dispositional tendencies (Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008).

Executive functioning is also thought to play a role in the self-regulation of emotions,
which is considered pivotal in understanding models of gambling (Blaszczynski & Nower, 2002; Jacobs, 1986; Stewart & Zack, 2008). Studies have shown that variations in baseline activation of the prefrontal cortex, which is responsible for controlling executive functions, has implications for emotion regulation ability. For example, a study by Jackson and colleagues (2003) found that individual differences in emotion regulation were linked to asymmetrical frontal lobe activation, where greater neural activity in the left prefrontal lobe versus the right prefrontal lobe was associated with greater regulation of negative emotions upon exposure to aversive stimuli. These results suggest that executive functioning mediated by the prefrontal cortex is crucial to the regulation of emotional experiences. Regarding working memory, a central component to self-regulation, it has also been suggested that the various stages of emotion regulation are guided by this capacity, via the creation of a mental ‘workspace’ for the regulation of emotion (Hofmann, Schmeichel, & Baddeley, 2012). Furthermore, working memory has been implicated in various forms of emotion regulation including cognitive reappraisal and emotional expression (Gross, 1998; Schmeichel, Volokhov, & Demaree, 2008; Wranik, Barrett, & Salovey, 2007). Taken together, these findings provide further support for the crucial role of executive functioning in self-regulation processes, including the self-regulation of emotion.

Although executive cognitive functioning is critical to self-regulation, it is not synonymous with self-regulation, according to the bidirectional model of executive functioning (Blair & Ursache, 2004, 2011). In this model, executive thinking skills can and often do facilitate self-control, however the bidirectional model also emphasizes the important relationship between higher order executive skills and lower order automatic aspects of self-regulation (such as the regulation of emotion, attention, and stress physiology) as well as the
complexities of this relationship dynamic (Blair & Ursache, 2004, 2011). For example, the bidirectional model suggests that during periods of stress or cognitive depletion, individuals’ ability to engage in executive cognitive processes, and thereby self-control, is compromised. By drawing a link between negative emotional states and decreases in executive cognitive ability, the bidirectional theory begins to illustrate how failures in self-regulation due to emotional distress might contribute to the development of gambling problems (Blair & Ursache, 2004; Lalande & Ladouceur, 2011).

Baumeister’s theory regarding the limited capacity of self-regulatory ability supports the view that self-regulation may be thwarted by certain psychological processes; this area of research has demonstrated that when individuals are depleted of cognitive resources, they have more difficulty regulating their behaviours in a goal directed manner (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister & Heatherton, 1996; Vohs & Baumeister, 2004, 2011). Self-control is compared to a muscle or a limited energy source in this theory, whereby engaging in one act of self-control exhausts this energy source and temporarily limits further acts of self-control. This mental muscle or energy source is able to regain its strength after a sufficient rest or delay (Baumesiter & Heatherton, 1996; Baumeister et al., 1998; Muraven & Baumeister, 2000). Overall, this self-regulation theory posits that the efficacy of executive cognitive abilities is fueled by reserves of psychological energy. When these reserves are diminished, executive cognitive abilities can no longer foster self-control and could potentially lead to excessive and risky behaviours such as gambling. Previous research, including neuroimaging studies, provided support for theoretical models regarding the limited capacity of self-regulatory ability (Baumeister et al., 1998; Baumeister & Heatherton, 1996; Muraven & Baumeister, 2000) by demonstrating how factors such emotional distress negatively impacted
pre-frontal cognitive functioning and impaired performance on subsequent tasks involving executive self-control (Chester et al., 2016; Curci, Lanciano, Soleti, & Rime, 2013).

Temporal models may also explain self-regulatory failure contributing to maladaptive gambling behavioural patterns. Hall and Fong’s (2007) theory of temporal self-regulation describes how behaviour is typically guided by temporally proximal or short-term outcomes rather than temporally distal or long-term outcomes. According to this theory, maladaptive behaviours are often associated with immediate rewards that serve to increase intent towards engaging in these behaviours at the expense of long-term adaptive outcomes. This is particularly the case in the presence of diminished self-regulatory capacity, frequent past engagement of the maladaptive behaviour, and environmental cues that support the maladaptive behaviour (Hall & Fong, 2007). Regarding self-regulation, these authors suggest that individual difference factors such as heightened executive dysfunction, increase propensity towards maladaptive behaviour, as it is posited that individuals with poor self-control related to executive dysfunction have greater difficulty resisting the immediate short-term rewards of maladaptive behaviours such as risky gambling.

The theory of temporal self-regulation (Hall & Fong, 2007) is complementary to the delay-discounting model of behaviour, which has been linked to addictions and gambling in particular (Reynolds, 2006). According to the delay-discounting model, the long-term and often more beneficial outcomes of a particular behaviour exert less influence over control of that behaviour because they are delayed, whereas short-term reinforcement contingencies are more influential (Reynolds, 2006). Previous researchers have found that greater delayed discounting is positively associated with problem gambling (Alessi & Petry, 2003; Ledgerwood, Alessi, Phoenix, & Petry, 2003; Stea, Hodgins, & Lambert, 2011). Furthermore, researchers have
documented an association between delayed-discounting and executive cognitive impairment (Clark, Kassman, Derenne, & Weatherly, 2014; Weatherly & Ferraro, 2011). Taken together, previous theory and literature has established a relationship between executive functioning and self-regulation processes with important implications for maladaptive patterns of gambling.

Executive Functioning and Gambling

Research in cognitive psychology has mapped the neural underpinnings of various executive functioning abilities, and work in the field of self-regulation suggests that failures in the ability to control one’s actions and engage in appropriate goal-directed behaviour influence the development of addictive patterns of behaviour (Hull & Slone, 2004; Sayette & Griffin, 2004). As reviewed in the previous section, the literature has supported a link between these two fields of research, by demonstrating that various executive functioning abilities facilitate self-regulation processes (Hofmann et al., 2012). Since executive functions are involved in more effortful or deliberative aspects of self-regulation, and failures in self-regulation are associated with addictive behaviours (Hull & Slone, 2004; Sayette & Griffin, 2004), it follows that deficits in executive cognitive abilities would likely have important implications for the development of problems with gambling.

Several studies have identified a link between problematic gambling and impairments in executive functioning. For example, Cavedini et al. (2002) found similarities between individuals with pathological gambling and those with damage to the frontal lobes, in terms of decision-making impairments on a gambling task. In addition, studies conducted by Alvarez-Moya et al. (2011) and Ochoa et al. (2013) utilized executive functioning and decision-making tasks to assess individuals with pathological gambling recruited from treatment settings, and linked risky decision-making patterns involved in gambling to executive cognitive impairment.
involving inhibitory control. Alvarez-Moya et al. (2011) were interested in exploring the relationship between deficits in self-regulation, reflected by levels of self-reported impulsivity and neuropsychological measures of executive functioning and decision-making, and treatment outcomes with respect to rates of dropout and relapse for participants receiving gambling treatment. They found that for pathological gamblers, greater executive dysfunction, and higher impulsivity predicted treatment dropout but not relapse. Ochoa and colleagues (2013) were interested in how deficits in executive functioning and impulsivity impacted decision-making involved in gambling tasks during conditions of high-risk. They found that greater executive impairment and impulsivity were associated with decreased ability to engage in self-regulation and decreased ability to make appropriate decisions in high-risk situations (Ochoa et al., 2013).

The literature has established links between attention deficit-hyperactivity disorder (ADHD) and problem gambling given similar deficits in self-regulatory functions in these disorders, including cognitive processes involved in impulsivity, attention control, reward processing, and decision-making (Abouzari, Oberg, Gruber, & Tata, 2015; Chamberlain, Derbyshire, Lepink, & Grant, 2015). Studies have in fact shown that approximately 20-25% of problem gamblers meet criteria for probable ADHD (Chamberlain et al., 2015; Waluk, Youssef, & Dowling, 2016). Furthermore, problem gamblers who meet criteria for ADHD had more difficulty on gambling decision-making tasks than problem gamblers without an ADHD diagnosis (Abouzari et al., 2015; Chamberlain et al., 2015). As both ADHD and problem gambling have been linked with executive dysfunction and have similar self-regulatory deficits (Alvarez-Moya et al., 2011; Barkley & Murphy, 2010; Kamradt, Ullsperger, & Nikolas, 2014; Ochoa et al., 2013), research in this area suggests that the combined presence of ADHD and problem gambling may indicate more severe executive dysfunction and thus increased gambling
problems (Brandt & Fischer, 2017). Brandt and Fischer (2017) specifically found that gamblers with ADHD had more severe gambling problems than those without ADHD. These studies emphasize that heightened impairment in executive functioning associated with self-regulation appears to play an important role in problem gambling.

Research has also indicated that in comparison to control groups, individuals with pathological gambling show relatively poorer performance on many aspects of executive functioning. Brand et al. (2005) found that individuals with pathological gambling had impaired decision-making abilities in comparison to healthy controls. Gamblers in this study also exhibited relative impairments on executive measures related to categorization, cognitive flexibility, set-shifting, and interference susceptibility. Through the administration of a battery of neuropsychological measures assessing executive functioning, Goudriaan et al. (2006) found that gamblers had greater deficits in cognitive flexibility, planning, response inhibition, and time estimation relative to healthy controls. Taken together, these findings indicate that difficulties with gambling are reflected neuropsychologically in impaired executive functioning, including impairments in decision-making, planning, and response inhibition. These executive functions are likely important for key self-regulatory tasks involved in gambling such as goal setting and reducing discrepancies between goals and behaviours.

Other researchers have also documented executive cognitive impairments on specific cognitive and neuropsychological assessment measures. Kertzman et al. (2006) administered the reverse Stroop Colour-Word Test to pathological gamblers, given its ability to assess inhibition of interfering stimuli. They found that gamblers were slower and less accurate than controls on the Stroop task, suggesting that gamblers have impaired inhibitory control (Kertzman et al., 2006).
A study conducted by Ledgerwood and colleagues (2012) compared pathological gamblers and healthy controls on a number of executive cognitive measures. This study highlighted that planning, as measured by the Tower of London, seems to be most impaired in pathological gamblers, corroborating findings from the study conducted by Goudriaan et al. (2006). Gamblers in this sample also performed poorly on decision-making abilities on the Iowa Gambling Task in comparison to controls, also consistent with previous research (Brand et al., 2005; Cavedini et al., 2002), and had greater cognitive perseveration on the Wisconsin Card Sorting Test in comparison to controls. Given that gamblers have lower scores on measures of executive functioning than healthy controls, these findings further support the notion that deficits in executive functioning impact the development of problem gambling, as poor executive functioning likely contributes to self-regulation failures in these individuals.

Furthermore, functional magnetic resonance imaging has corroborated neuropsychological findings documenting impairments in executive cognitive functioning in gamblers. During performance on a Stroop task, studies found pathological gamblers, in comparison to controls, to have decreased activity in brain regions involved in executive functioning, including the frontal and orbitofrontal cortex, and decreased functioning in the ventromedial prefrontal cortex (Potenza, 2003a, 2003b). These studies suggest that pathological gamblers may experience significant impairment in executive functioning, represented by underlying cognitive deficits in prefrontal functioning, when compared to healthy individuals.

Despite the observed associations between gambling and executive functioning, there is still insufficient research in this area, with clear limitations and gaps in the literature. Although many of the studies refer to self-regulation in relation to executive functioning deficits, none make direct links or observations about the mechanisms involved in self-regulation and how
self-regulation impacts the development and maintenance of problematic gambling. This literature also does not investigate how other components of self-regulation, namely emotion regulation, influence the mechanisms involved in this relationship. For these reasons, additional research is needed to inform a comprehensive model of gambling that delineates the links between executive functioning, self-regulation, and gambling. Another common limitation of the research to date is the heavy emphasis on utilizing male and treatment-seeking samples; the nature of executive impairment in individuals diagnosed with pathological gambling might differ when extrapolating to a more diverse range of gamblers (Alvarez-Moya et al., 2011; Brand et al., 2005; Oacha et al., 2013). The relationship between gambling and executive functioning has not been explored or documented in other types of less impaired gamblers and limits the generalizability of the findings to females and other members of the general community who may also face difficulties with gambling.

**Emotion Regulation**

Both theory and research have established a link between emotion regulation and the development of gambling problems (Blaszczynski & Nower, 2002; Jacobs, 1986; Rockloff & Dyer, 2006; Stewart & Zack, 2008). There is much overlap between the terms *self-regulation* and *emotion regulation*. Given that self-regulation often involves the regulation of emotionally provoking stimuli, it follows that the processes of self-regulation are closely related to the processes of emotion regulation (Vohs & Baumeister, 2004). Theorists and researchers often consider emotion-regulation as falling within the broader category of self-regulation, however distinctions are made between the self-regulation of action (self-regulation) and the self-regulation of emotion (emotion regulation). Emotion regulation can be thought of as a broad
concept that includes related concepts such as mood regulation, coping with stress, and affect regulation (Koole, Van Dillen, & Sheppes, 2011).

The self-regulation of emotion is generally considered as a deliberate and effortful process aimed towards the redirection of spontaneous emotional responses (Koole et al., 2011). In Lazarus’ (1991) description of emotional processes, individuals experience a primary emotional response, involving an immediate, raw, and unregulated response to emotional stimuli, as well as a secondary emotional response, involving the ability to cope with the primary emotional response. The primary emotional response can be thought of as emotional sensitivity, that is, how easily or quickly an emotional state is experienced, conceptualized as the onset of emotion. Emotional sensitivity is influenced by factors such as the nature and quality of the emotion-provoking stimuli, personal characteristics, and the broader environmental context (Koole et al., 2011). On the other hand, emotion regulation encompasses the offset of an emotion and describes how quickly and easily an emotional state returns to a neutral baseline. The offset process hinges on the efficiency and/or complexity of the emotion regulation strategy employed, however the return to baseline may be achieved without any conscious regulatory effort by the psychological adaptation involved in habituation. In addition to decreasing the intensity of a given emotional state (down-regulation), emotion regulation could also involve increasing or maintaining the intensity of an emotional response (up-regulation; Koole et al., 2011).

Given that emotion regulation is a form of self-regulation, several theories have been proposed to describe the ways in which control processes are involved in emotion regulation (Koole et al., 2011). Goal-oriented models depict emotion regulation as an effortful self-regulation process associated with cognitive control (Koole et al., 2011). In this model, emotion
regulation occurs through a monitoring process in which one’s current emotional state is compared with a desired emotional state or goal. A subsequent operating system reduces any detected discrepancies between these two states by engaging effortful regulatory processes that enable the current emotional state to match the desired goal state. Goal-directed emotion regulation draws from the same neurological and psychological systems involved in effortful cognitive control and self-regulation (Koole et al., 2011).

Studies in this area have found that the neocortex has the ability to inhibit the responses of the amygdala, the brain region central for emotional experiences, through conscious cognitive control (Ochsner & Gross, 2005; Ochsner et al., 2004). In particular, the literature has found that the prefrontal region of the cerebral cortex engages in the regulation of emotional responses in the amygdala. Pathways between the prefrontal cortex and the amygdala are crucial for the integration of emotional and cognitive responses (Ochsner & Gross, 2005; Ochsner et al., 2004). These findings reinforce previously identified links between executive functioning and emotion regulation (Schmeichel, 2006; Schmeichel et al., 2008).

Although goal-oriented models are comprehensive in capturing the fundamentals of the emotion regulation process, additional aspects of emotion-regulatory functions are captured by need-oriented models of emotion regulation (Koole et al., 2011). This type of emotion-regulation is driven by basic hedonic needs to seek pleasure and avoid pain, seen in early infancy before the development of linguistic representations of goals. Need-oriented emotion regulation is predisposed towards a hedonic drive towards immediate pleasure and positive emotional states and as such, may conflict with long-term goal-directed emotion regulation associated with more rational action tendencies. In the gambling literature, when individuals are unable to look beyond their immediate needs and impulses in order to think about their long-
term goals and the long-term consequences of their actions, they have failed at a phenomenon known as *transcendence* (Baumeister et al., 1994; Sayette, 2004). Individuals who have difficulty with transcendence during gambling have been found to immerse themselves in gambling, which may be associated with a desire to escape from negative affect (Dickerson, Cunningham, England, & Hinchy, 1991), and a limited ability to see past immediate cues and stimuli (Baumeister et al., 1994). Transcendence failure in this regard is reported to be a common feature of compulsive and pathological patterns of gambling (Baumeister et al., 1994; Leisure, 1992).

In their study, Tice, Bratslavsky, and Baumeister (2001) explored the conflict between the hedonic goal of short-term reward and optimal long-term goals. These researchers suggested that the ability to self-regulate evolved over time so that humans could resist immediate impulses in order to achieve long-term goals. The conflict between immediate pleasure and long-term goal regulation is exacerbated during states of emotional distress, when the urge to escape from negative feelings could strengthen the internal drive towards seeking immediate pleasure and relief, which more often than not involves impulsive behaviours. In this way, it was proposed that an “antipathy” exists between emotion regulation and higher-order behavioural self-control. Through a series of experiments Tice and colleagues (2001) confirmed their hypothesis, where feelings of emotional distress were often associated with prioritizing the attainment of short-term pleasure along with the sacrifice of adaptive long-term goals. For example, a study exploring the link between self-regulation and dieting examined whether participants were able to adhere to adaptive diet-related standards after being required to exert cognitive effort by suppressing their emotional responses (Hofmann, Rauch, & Gawrosnki, 2007). It was found that participants required to engage in emotional self-control were less
successful at controlling behavior in other areas (i.e., sticking to diet-related standards) than individuals who were not required to exert emotional self-control (Hofmann et al., 2007).

One possible explanation for why emotional distress negatively impacts adaptive self-regulation revisits Baumeister’s conceptualization of self-regulation capacity as a limited energy reserve (Baumeister et al., 1998). Factors such as emotional distress or acts of behavioural or emotional self-control deplete reserves of self-regulatory ability, leaving individuals with little psychological strength to resist gratification and short-term pleasure. As mentioned previously, neuroimaging studies have documented how emotional distress inhibits executive cognitive control and subsequent efforts to engage in self-control (Chester et al., 2016; Wagner & Heatherton, 2013). Applied to gambling, the link between finite self-regulatory capacity and emotional distress sheds further light on self-regulatory mechanisms involved in gambling; namely that controlling gambling behavior is more difficult when cognitive resources underlying self-regulation are constrained by the demands of negative affective states.

*Emotion Regulation and Gambling*

When an emotion is highly intense, overwhelming, or difficult to tolerate, such that it contributes to difficulties in social and occupational functioning, an individual’s emotional behaviour can be described as being “dysregulated”. In other words, the individual has lost the ability to balance, regulate, or cope with his or her affective experiences in a healthy manner. More specifically, a disturbance in emotion regulation (i.e., emotion dysregulation) involves emotional instability or mood swings, challenges with inhibiting the expression of strong affect, and difficulties modulating or terminating negative internal states (Gratz & Roemer, 2004; Linehan, 1993). The ability to manage emotional experiences adaptively is integral to effective self-regulation. Alternatively, difficulties in emotion regulation have been found to be
associated with a number of maladaptive outcomes, as individuals may be more likely to turn to risky externalizing behaviors (e.g., harmful gambling) in order to regulate their internal distress (Allen, 2001; Briere & Runtz, 2002; DeBellis, 2001; Campbell-Sills & Barlow, 2007).

Individuals with gambling problems appear to have higher levels of emotion regulation difficulties than the general population. A study conducted by Williams, Grisham, Erksine, and Cassedy (2012) demonstrated the presence of specific emotion regulation deficits in those with pathological gambling patterns, including impairments in emotional clarity and awareness, greater impulsivity, and limited access to adaptive coping strategies in comparison to clinical and healthy control groups. As such it can be seen that the link between emotion dysregulation and problematic gambling is important to further investigate.

Inquiry in the area of emotion regulation and gambling has strong theoretical underpinnings within the framework of Jacobs’ (1986) General Theory of Addictions, which highlights emotion regulation (i.e., enhancement of positive emotions and escape from negative emotions) as an important motive for gambling. Blaszczynski and Nower (2002) built on this theoretical framework with their comprehensive conceptualization of the emotionally vulnerable problem gambler, wherein gambling to modulate aversive emotional states or to meet specific psychological needs comprises a particularly risky profile for the development of gambling addictions. A study by Gupta and Derevensky (1998) provided empirical support for Jacobs’ theory and the role of emotion regulation in the maintenance of harmful gambling. In addition, recent studies have similarly established that long-standing beliefs and values about the effects of gambling, including coping or escaping from negative mood (coping motives) and enhancing positive mood (enhancement motives), are important emotion regulation motives for gambling frequency and gambling problems (Stewart & Zack, 2008; Stewart et al., 2008). Findings from
these studies indicated that higher levels of emotion regulation motivated gambling (i.e., endorsement of coping and enhancement gambling motives) were associated with more severe gambling frequency and problems than lower levels of emotion regulation motivated gambling (Stewart & Zack, 2008; Stewart et al., 2008). Mood-regulation related gambling expectancies, involving individuals’ immediate beliefs or expectations about what will happen when they gamble, also play an important role in gambling-related emotion regulation. An investigation by Stewart and Wall (2005) demonstrated that in states of negative mood, individuals’ self-generated expectancies about the emotion regulation function of gambling corresponded to their overall motivations for gambling, which authors postulated play an important role in prompting potential problematic gambling.

A grounded theory analysis of emotion regulation and gambling conducted by Rickets and Macaskill (2003) further highlights the important role that emotion regulation plays in motivating gambling behaviour. In this study, 14 male treatment-seeking gamblers underwent in-depth interviews. Thematic analysis revealed that the emotion regulation component of gambling was central to all participants, where participants reported to engage in gambling to either suppress or induce arousal due a lack of other adaptive coping strategies for managing emotions. Participants also reported that their gambling habits were associated with heavy negative consequences in financial and relationship domains and that this was due to the fact that they had difficulties in controlling their gambling behaviour. Repeated failures in effortful control of gambling resulted in tolerance of high levels of costs and repeated cycles of gambling (Rickets & Macaskill, 2003).

More recently, researchers have identified that gambling to escape negative emotions is more strongly associated with higher gambling frequency, gambling problems, and potential
gambling pathology, when compared to positive reinforcement motives for gambling engagement (Rockloff & Dyer, 2006; Thomas et al., 2011). An important study by Weatherly and Miller (2013) explored gambling as an emotion regulation strategy that individuals use to escape from negative affect. They conducted two separate experiments: the first experiment was designed to evaluate which aspects of executive functioning were associated with escape related gambling contingencies, and the second experiment was arranged to test which aspects of emotion dysregulation predicted gambling as an escape. In the first experiment, the Executive Functioning Index (EFI; Spinella, 2005) was administered to 1, 149 university students to measure executive functioning. It was predicted that two aspects of this measure, empathy and impulsivity, would predict escape related gambling motives. Results indicated that gambling to escape from negative emotions was associated with executive functioning factors underlying empathy. In the second experiment 2, 269 university students were given the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) to measure participants’ current affective state and the Difficulty in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) to measure participants’ overall emotion regulation patterns. The authors hypothesized that experiencing negative affect and endorsing impulsive emotion regulation patterns in response to negative affect would subsequently predict escape related motives for gambling. It was found that impulsivity, in relation to dealing with negative emotions, was unique in predicting gambling as an escape from distressing affect and that unexpectedly negative mood did not predict escape-related gambling contingencies. Significant effects regarding negative mood may not have been detected given that mood was examined retrospectively without the use of any mood induction procedures, and so negative mood in this study may not have been pronounced enough to clearly examine its impact on gambling. Although negative
mood/emotional distress was not found to relate to gambling as an escape, Weatherly and Miller’s (2013) study was pivotal in drawing links between executive functioning and self-regulation failure in terms of using gambling as a means to escape from negative emotions.

Although studies have implicated the importance of executive impairment and difficulties with self-and-emotion regulation in the development and maintenance of problem gambling, few studies have directly examined the relationships between executive cognitive dysfunction, self/emotion regulation, emotional distress, and emotion regulation motivated gambling in a simultaneous fashion, particularly in non-treatment seeking individuals from the general community.

Summary, Research Goals, and Hypotheses

Self-regulation, in terms of one’s ability to engage in goal-directed behaviour and manage emotional experiences, has emerged as an important component in understanding why individuals may form maladaptive patterns of gambling (Baumeister et al., 1994; Vohs & Baumesiter, 2004). However, self-regulation remains a broad psychosocial construct that has received little empirical attention with regards to its connection to problematic gambling. In the current study, the construct of self-regulation will be primarily examined by assessing cognitive functions that underlie one’s ability to engage in the self-regulation of behaviour and emotions (Hofmann et al., 2012). As described above, the prefrontal cortex of the brain houses executive cognitive functioning, which controls impulses and organizes behaviour in line with long-term goals and adaptive functioning (Hofmann et al., 2012). Given that executive functioning underlies self-regulation, individual differences in executive functioning and their association with self-regulation, and in turn gambling problems, will be examined in the present study.

In particular, studies in this area have established that individuals with poorer executive
cognitive abilities show decreased capacity to control and regulate emotional responding (Schmeichel et al., 2008). It is also known that individuals with poorer executive functioning skills are more likely to have addictions such as problem gambling, and involve themselves in potentially harmful activities such as high-risk gambling in order to avoid or escape from negative emotions and/or to boost positive feelings (Gupta & Derevensky, 2008; Ledgerwood et al., 2012; Rickets & Macaskill, 2003; Weatherly & Miller, 2013). Many theories seeking to understand why gambling addictions develop point to emotional management and emotional coping as the main impetus or motive for gambling (Jacobs, 1986; Stewart & Wall; Stewart & Zack, 2008; Rockloff & Dyer, 2006; Thomas et al. 2011; Weatherly & Miller, 2013).

In summary, it has been established that there is a link between impaired executive functioning and problem gambling. It is also known that executive functioning underlies the ability to regulate goal directed behaviour and emotional responses. Relatively lower executive functioning abilities would produce a risk for gambling addiction, given that the literature shows that deficits in cognitive functioning, such as working memory difficulties, contribute to self-regulatory failures (i.e., decreased ability to set goals, monitor behaviour in relation to goals, and identify and reduce any discrepancies) and difficulties with regulating emotions (Hofmann et al., 2012; Schmeichel et al., 2008). Furthermore, models of addiction indicate that failures in the process of self-regulation and emotion regulation have implications for addictive behaviour (Sayette, 2004; Sayette & Griffin, 2011). The dysregulation of emotion in particular has been highlighted as an important driving factor for unhealthy immersion in gambling activities (Dickerson, 1991; Baumeister et al., 1994). Literature on self-regulation failures has also indicated that states of emotional distress may create a climate for maladaptive behaviours as individuals may be more likely to succumb to immediate impulsive needs and lose sight of
adaptive long-term goals (Baumeister et al., 1994; Tice et al., 2001). Little research has measured how difficulties in executive functioning relate to deficits in emotion regulation, and how the interplay between these factors increases the likelihood that individuals will experience gambling problems, particularly in conditions of emotional distress. It would thus be important to investigate the interconnections between all of these variables in order to better understand factors that give rise to problematic gambling. The present study is one of the first to specifically investigate how the links between executive functioning and emotion regulation impact the development of gambling problems, and as such, aimed to add to conceptual models regarding the etiology and development of gambling addictions.

Two models involving self-regulation and gambling were tested in the current study; the first model examined self-regulation and gambling from an individual differences perspective, and the second model examined the moderating influence of current negative mood (i.e., emotional distress) on the link between self-regulation and gambling. A measure of impulsivity was also included in order to explore its relationship with executive dysfunction, and its associated impact on emotion dysregulation and gambling.

First Research Goal

The first major research goal for the current study was to examine the relationship between executive functioning, emotion regulation, gambling motives, and gambling behaviour, in gamblers recruited from the general community. It was hypothesized that gamblers with poorer executive functioning ability would have greater difficulties with emotion regulation, would be more likely to endorse motives to gamble for emotion regulation purposes, and would engage in higher levels of gambling involvement and gambling problems, given their impaired
ability to manage emotional experiences and their diminished capacity to engage in controlled and goal-directed behaviour.

Specifically, it was hypothesized that lower executive functioning (executive dysfunction) would directly predict gambling problems, as executive cognitive deficits have been documented in those with problematic gambling (Ledgerwood et al., 2012). It was also hypothesized that executive dysfunction would directly predict emotion regulation difficulties (emotion dysregulation). Furthermore, it was expected that emotion dysregulation would directly predict greater endorsement of gambling motives to cope with negative affect and enhance positive affect. Gambling motives have been established as important proximal predictors of gambling and gambling-related consequences (Stewart & Zack, 2008; Stewart et al. 2008). In addition, gambling motives have previously been identified as explanatory mechanisms and mediators in pathways leading to gambling (Goldstein, Stewart, Hoaken, & Flett, 2014; Schalgintweit, Thompson, Goldstein, & Stewart, 2017). It was thus expected that emotion dysregulation would mediate the indirect relationship between executive dysfunction and gambling motives. Subsequently, motives to gamble were hypothesized to predict increased gambling frequency and gambling problems; gambling motives were expected to significantly mediate the link between emotion dysregulation and gambling outcome variables (gambling frequency and problems). Please see figure 1 for a diagrammatic representation of the hypothesized relationships between the key variables involved in the first research goal.
The purpose of the second research goal was to further explore the dynamics between executive functioning, emotion regulation, and gambling-related emotion regulation in the context of current negative affect. The regulation of goal-directed behaviour and emotional experiences are closely linked, and as such they are both components of self-regulatory behaviour and are both mediated by executive cognitive abilities (Hoffman et al., 2012; Schmeichel et al., 2008; Wagner & Heatherton, 2013). As discussed previously, researchers have found that states of emotional distress may put cognitive self-regulation in jeopardy, making it more likely that individuals will give into impulses or engage in potentially risky activities that bring about an immediate boost in positive affect, thereby failing to adhere to their optimal long-term goals (Tice, Bratslavsky, & Baumeister, 2001). Researchers have also shown that being in a state of negative affect increases the likelihood that individuals will fail at self-control and increases the likelihood that individuals will engage in immediately self-rewarding...
or self-gratifying behaviour for emotion regulation purposes, potentially resulting in adverse long-term consequences (Fry, 1975; Mischel, Ebbesen, & Zeiss, 1973; Schwartz & Pollack, 1977; Tice et al., 2001; Wagner & Heatherton, 2015; Wertheim & Schwartz, 1983). Findings have generally indicated that those with poorer executive cognitive abilities (e.g., working memory) have more difficulty controlling emotional experiences and responses than those with greater executive cognitive abilities (Hofmann et al., 2012; Schmeichel et al., 2008). To date, little research has examined whether and how current negative affective states impact executive functioning and self-regulation in the context of gambling. In order to measure the immediate impact of negative mood on gambling for the second research goal, mood induction was employed to heighten emotional distress/negative affect and prospectively examine the impact of negative mood on self-regulatory control in gambling. In addition, participants’ immediate expectations about the extent to which they believed gambling would help them regulate their mood were measured. The second analysis examined these mood-based outcome expectancies for gambling using the Gambling Expectancies Questionnaire (GEQ; Stewart & Wall, 2005), a two-factor measure designed to tap into relief expectancies, involving expectations that gambling will help with escaping from or reducing negative affect, and reward expectancies, pertaining to expectations that gambling will boost levels of positive emotion. The assessment of gambling expectancies versus gambling motives was better suited for the second research goal given that expectancies assess participants’ current and immediate beliefs about the outcome of a future gambling activity, whereas gambling motives capture long-standing tendencies to engage in emotion-motivated gambling (Stewart & Wall, 2005; Stewart & Zack, 2008). Indeed, participants were instructed to focus on how they were thinking or feeling in the present moment when rating the extent to which they expected gambling would contribute to
relief from negative affect or enhancement of positive affect. Gambling expectancies were thought serve as a proxy for evaluating immediate tendencies towards risky gambling decisions in the second research goal, as higher endorsement of gambling expectancies for mood regulation has been empirically linked with more frequent and severe gambling patterns (Stewart & Wall, 2005).

The second research goal assessed the link between executive dysfunction, emotion dysregulation, and gambling expectancies in the context of negative affect in comparison to positive affect. It was predicted that greater executive dysfunction would be associated with higher gambling expectancy scores, but that this relationship would be mediated by greater emotion dysregulation. Furthermore, it was expected that the indirect association between executive dysfunction and gambling expectancies, through the influence of emotion dysregulation, would be moderated by negative mood (i.e., this indirect link would be stronger in a negative mood state versus a positive mood state). Please refer to Figure 2 for a model of the relationship between the variables under investigation pertaining to the second research goal.

*Figure 2.* Diagrammatic representation of the relationships between key study variables in the second research goal.
Chapter 2: Methods

Participants

Participants were male and female regular gamblers recruited from the general community within the province of Ontario. Eligibility criteria for participation in the study included being at least 19 years of age and having gambled at least two times in the past 30 days. In total, 156 community recruited gamblers consented to participate in the study and started the online survey; of the 156 participants who consented, 32 participants provided only demographic information and were dropped from further analyses. In addition, seven participants completed measures early in the survey (2 - 4 questionnaires), but did not complete the gambling motives or expectancies questionnaires and were not exposed to the mood manipulation. These participants were therefore dropped from further analyses. The final sample size for the study was 118. Of note, the completion rate increased once the study incentive changed from a draw to a gift card. This sample of 118 community gamblers ranged in age from 19 to 57 ($M = 29.66; SD = 9.65$) and was 49.2% male.

Procedure

Participants were recruited through advertisements (Appendix A) posted on community websites including: Craigslist, Kijiji, Facebook, Twitter, etc. Recruitment posters were also advertised in designated posting areas within the University of Toronto campus and in the general community within the Greater Toronto Area. Furthermore, participants were recruited from a pool of gamblers involved in an ongoing study on mood and gambling, who previously consented to being contacted for recruitment into other studies on the topic of gambling.

The first component of the online survey involved the consent form/ information sheet (Appendix B), which described the purpose, risks and benefits, and procedures of the study,
including the approximate length of the survey (i.e., 30 minutes). Participants provided informed consent by clicking a box indicating their awareness of the study requirements and agreement to participate in the online survey. In order to determine eligibility to complete the survey, the first two questions of the survey asked participants to provide their age to determine whether or not they met the current study’s age criteria (i.e., 19 years of age or older) and indicate how many times they gambled in the past month (in order to assess whether they gambled at least twice in the past 30 days). Individuals who did not meet the age and/or gambling criteria were directed to a screen explaining their ineligibility to participate in the survey (e.g., “Sorry, you do not meet the requirements for this study”). Participants who met the eligibility criteria were directed to complete the online survey, which included demographic items and a series of online self-report questionnaires (Appendix C). Upon completion of the survey, participants were provided a printable “Resource Sheet” with a list of various community resources that help individuals with mental health or gambling problems (Appendix D). The resource sheet also contained contact information of the Principal Investigator for any direct questions or concerns about the study. Participants were provided detailed information on how to erase all survey data from their own computers to ensure that other users of the computer could not see that they had been involved in the study. When participants completed the survey, they were given the option to enter into a draw to win 1 of 2 online $150 gift certificates from Amazon.ca in appreciation for their time; the compensation strategy was later changed to providing a $5 Amazon.ca gift card for participants who completed the survey and chose to receive a gift certificate. Participants’ email addresses were entered in a separate form to ensure that they were not connected with survey data.
Measures

Individuals who consented to participate in the study and met the eligibility criteria were directed to complete a series of self-report questionnaires, which assessed demographic information, executive functioning, emotion regulation difficulties, gambling frequency and severity, motives for gambling, current mood, and gambling expectancies. In order to assess the impact of current negative mood on gambling behaviour, participants were administered a mood manipulation, that required them to read a story designed to induce either positive or negative mood (Appendix C). The positive and negative mood stories administered in the current study were used in previous research and found to be effective in inducing positive and negative mood respectively (Erber, 1991). Participants were asked to rate their mood both before and after reading the mood manipulation story. Participants were randomly assigned to either the positive or negative mood manipulation condition based on their birth month (i.e., participants born between the months of January to June were directed to read the negative mood manipulation passage and participants born between the months of July to December were directed to read the positive mood manipulation passage).

Demographic Information. Items assessing participants’ demographic information included questions about participants’ age, gender, level of education, employment and financial status, and ethnic/cultural background.

Executive functioning. Executive cognitive functioning was assessed with the Executive Functioning Index (EFI; Spinella, 2005). The EFI is a self-report measure of executive functioning that was developed in a community sample. The EFI consists of 27-items that group into five factors: empathy (i.e., concern for others, aggressive social stance); strategic planning (anticipation of consequences, saving money); organization (multitasking, sequencing); impulse
control (risk taking, substance abuse, excessive spending); and motivational drive (activity level, drive). Participants indicated the extent to which each item described them on a 5-point Likert scale, ranging from 1 (Not at all) to 5 (Very much). The EFI has demonstrated good concurrent validity with other measures of executive functioning, as well as data from neurological and imaging studies (e.g., self-report scores on EFI are consistent with imaging studies; Spinella, 2005). The EFI subscales were computed by summing items comprising each subscale. A total EFI score was created by summing together all the items on this measure (Spinella, 2005). Due to the focus on executive dysfunction in the current study, all EFI scores were reverse coded (except for those items that were originally intended to be reverse coded), in order to create subscale and total scores capturing executive dysfunction. The internal consistency of the total EFI score in the current study was good (Cronbach’s alpha = .80).

**Emotion Regulation.** Emotion dysregulation was assessed with the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS consists of 36-items that load onto six emotion regulation dimensions: nonacceptance of emotional response (e.g., “When I’m upset, I feel guilty for feeling that way”); difficulties engaging in goal directed behavior (e.g., “When I’m upset, I have difficulty concentrating”); impulse control difficulties (e.g., “When I’m upset, I lose control over my behaviours”); lack of emotional awareness (e.g., “When I am upset, I acknowledge my emotions” reverse scored); limited access to emotion regulation strategies (e.g., “When I’m upset, I believe I will remain that way for a long time”); and lack of emotional clarity (e.g., “I have no idea how I am feeling”). Participants rated the extent to which each item applied to them on a scale from 1 (Almost never) to 5 (Almost always). The DERS total scale has demonstrated high internal consistency (Cronbach’s alpha = .93) and good test-retest reliability (Gratz & Roemer, 2004). The DERS subscales were
computed by summing items comprising each subscale and a total DERS score was created by summing together all the items included in this measure (Gratz & Roemer, 2004). The internal consistency of the total DERS score in the current study was excellent (Cronbach’s alpha = .94).

*Impulsivity.* An abbreviated 15-item version of the Barratt Impulsiveness Scale (BIS 15; Spinella, 2007) was used to assess the level of impulsivity in participants. This impulsivity measure consists of three major factors: attention impulsivity (e.g., “I am restless at lectures or talks”); motor impulsivity (e.g., “I act on the spur of the moment”); and non-planning (e.g., “I say things without thinking”). Respondents were asked to indicate how well each item describes them on a scale of 1 (*Rarely/never*) to 4 (*Almost always*). Studies have indicated that the BIS is correlated with objective neuropsychological measures of impulsivity (Carrilo-de-la-Pena et al., 1993) and neuropsychological measures of prefrontal cognitive impairment. As such, the BIS 15 has demonstrated good concurrent validity. It also has high internal consistency (Cronbach’s alpha = .79). The BIS-15 subscales were computed by summing items comprising each subscale as well as the creation of a total BIS-15 score by summing together all the items on this measure (Spinella, 2007).

*Gambling Frequency and Gambling Problems.* Gambling involvement was assessed with the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), a multi-item self-report instrument, which measures the frequency, severity and consequences of gambling. The SOGS captures lifetime gambling frequency by asking participants to indicate how often they have engaged in various types of gambling activities, from 0 (*Never*), 1 (*Less than once a week*), to 2 (*Once a week or more*). In addition, the SOGS assessed whether or not (yes/no) individuals have experienced problems as a result of their gambling during the past 12 months (e.g., “have you borrowed money or stolen something in order to bet or to cover gambling debts?”). The SOGS
(Lesieur & Blume, 1987) is typically utilized as a screening tool for identifying problem
gambling with cut-off scores of 5 or more indicating probable pathological gambling (Lesieur &
Blume, 1987). The SOGS has demonstrated good psychometric properties including validity,
internal consistency, and test-retest reliability. Consistent with previous research (e.g.,
Neighbors, Lostutter, Larimer, & Takushi, 2002; Stewart, Zack, Collins, Klein, & Fragopoulos,
2008), the lifetime gambling frequency variable as measured by the SOGS was calculated by
taking the mean of the reported frequency for each type of gambling activity. The gambling
problems variable was calculated by taking the sum of appropriate items delineated in the SOGS
scoring criteria (Lesieur & Blume, 1987).

Gambling motives. Motives for gambling were assessed with the Gambling Motives
Questionnaire (GMQ; Stewart & Zack, 2008). This measure evaluates various reasons for
engaging in gambling, including coping with negative emotions (coping motives; e.g., “To
forget your worries”), motives to enhance positive affect (enhancement motives; e.g., “Because
it makes you feel good”), and social reinforcement motives (social motives; e.g., “Because it
makes social gatherings more enjoyable”). Participants indicated the frequency with which they
gamble for each reason using a 5-point Likert scale, ranging from 1 (Almost never/Never) to 5
(Assertly always/Always). Each GMQ subscale in the original sample demonstrated good internal
consistency with coefficient alphas greater than .80 for each subscale. The gambling motives
variables in the current study were computed by summing the items relevant to each motive
subscale (i.e., coping and enhancement motives; Stewart & Zack, 2008). The internal
consistencies of the coping motives subscale (Cronbach’s alpha = .88) and the enhancement
motives subscale (Cronbach’s alpha = .80) in the current study were good.
Current affective experiences. In order to assess affective experiences, participants were asked to report on several dimensions of positive and negative affect on a 5-point scale from 1 (Very slightly or not at all) to 5 (Extremely) indicating the extent to which they feel: Cheerful, Sad, Glad, Depressed, Pleased, Blue, Happy. Positive and negative mood variables were calculated by averaging the scores of positive and negative mood items respectively.

Gambling Expectancies. Gambling expectancies were assessed with the Gambling Expectancies Questionnaire (GEQ; Stewart & Wall, 2005) an 18-item questionnaire assessing individuals affect regulation related gambling expectancies. The items capture how participants are thinking or feeling at the moment they are filling out the questionnaire. The GEQ consists of two factors: relief expectancies (e.g., “I would feel less tense if I gambled now”); and reward expectancies (e.g., “I would feel better if I could gamble now”). Participants indicated how much they agree or disagree with each statement on a scale of 1 (strongly disagree) to 7 (strongly agree). The gambling expectancies variables were computed by summing the items relevant to each expectancy subscale (i.e., relief expectancies and reward expectancies; Stewart & Wall, 2005). The internal consistency for the relief expectancies subscale was excellent (Cronbach’s alpha = .96). The internal consistency for the reward expectancies subscale in the current study was acceptable (Cronbach’s alpha = .71).

Data Analysis

Prior to data analysis, all variables were examined for significant violations from normality. For the most part, variables were normally distributed. However, there was evidence of positive skewness for the gambling frequency variable ($M = 0.59; \text{Md} = 0.50$), based on visual screening of the scatter plot for gambling frequency and a skewness test value greater than one, which is generally considered to indicate significant departure from normality.
(Bulmer, 1979; West, Finch, & Curran, 1995); as such the gambling frequency variable was logarithmically transformed. With the exception of the preliminary analyses where the non-transformed scores are presented, all subsequent analyses utilized the logarithmically transformed gambling frequency variable.

Preliminary analyses involved calculating descriptive statistics and examining the bivariate correlations between the primary variables of interest: executive dysfunction, emotion dysregulation, motives for gambling, gambling expectancies, mood variables, gambling frequency, and gambling problems. Regarding the first research goal, path analysis using AMOS (Arbuckle, 2003), examined various pathways between executive dysfunction and emotion dysregulation, gambling motives (i.e., coping and enhancement), gambling frequency, and gambling problems. Path analysis is well-suited to analyzing the theoretical links between the variables pertaining to the first research goal, as the structural relationships among variables can be modelled pictorially for clearer conceptualization of the underlying theory and as the whole system of hypothesized relationships can be tested simultaneously in terms of the extent to which the fit of the model is consistent with the data (Byrne, 2001). In addition, AMOS provides estimates for direct effects between variables as well as for overall indirect effects of variables in the path model. Direct effects provide information on the association between a given variable and the variable it is next linked with in the path model. Indirect effects provide information regarding the association of a given variable on another variable through intervening or mediating variables (e.g., the overall indirect effect of emotion dysregulation on gambling frequency and gambling problems through the gambling motives variables). Specific indirect effects were also calculated through the process of creating user-defined estimands in AMOS, which enables overall indirect effects to be teased apart through analysis of individual
pathways between variables of interest. This process was completed to test the individual indirect effects of emotion dysregulation on gambling frequency and gambling problems though coping motives and enhancement motives individually.

In terms of the second research goal, in order to test the efficacy of the mood manipulation, a 2 x 2 repeated measures ANOVA was conducted to determine the impact of mood condition (negative mood condition versus positive mood condition) and time (pre mood manipulation versus post mood manipulation) on positive and negative affect. In order to test the main hypothesis for the second research goal, a moderated mediation analysis was conducted using the PROCESS macro (Hayes, 2012), which integrates both moderation and mediation functions in SPSS Regression Models. PROCESS allows one to estimate the effects of the mediator on the dependent variable as well as the influence of a moderator. To determine whether there is a significant moderated mediation effect, PROCESS provides an index of moderated mediation, which estimates the slope of the line representing the association between the moderator and the indirect effect (Hayes, 2015). In addition, PROCESS calculates the conditional indirect effects and associated 95% confidence intervals, which reflect conditional (i.e. differential) indirect effects at various levels of the moderator. Confidence intervals that do not include zero are considered significant. The current analysis utilized PROCESS model 14 (Hayes, 2012, 2013) to conduct the moderated mediation. In this model, executive dysfunction was posited as the independent variable, emotion dysregulation as the mediator, mood condition as the moderator (i.e., positive versus negative mood condition), and gambling relief and reward expectancies were the proposed outcome variables.
Chapter 3: Results

Demographic Characteristics

Demographic characteristics of the sample are listed in Table 1.

Table 1

Demographic characteristics of the sample (n=118).

<table>
<thead>
<tr>
<th>Background Variable</th>
<th>Descriptive Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, n (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>58 (49.2%)</td>
</tr>
<tr>
<td>Female</td>
<td>57 (48.3%)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (1.7%)</td>
</tr>
<tr>
<td>Did not respond</td>
<td>1 (0.8%)</td>
</tr>
<tr>
<td>Age, M (SD)</td>
<td>29.66 (9.65)</td>
</tr>
<tr>
<td>Ethnicity, n (%)</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>58 (49.2%)</td>
</tr>
<tr>
<td>East Asian</td>
<td>21 (17.8%)</td>
</tr>
<tr>
<td>South Asian</td>
<td>14 (11.9%)</td>
</tr>
<tr>
<td>African Canadian</td>
<td>9 (7.6%)</td>
</tr>
<tr>
<td>West Indian/Caribbean</td>
<td>6 (5.1%)</td>
</tr>
<tr>
<td>Middle Eastern</td>
<td>2 (1.7%)</td>
</tr>
<tr>
<td>Indigenous</td>
<td>1 (0.8%)</td>
</tr>
<tr>
<td>Latin American</td>
<td>1 (0.8%)</td>
</tr>
<tr>
<td>Multi-ethnic or other</td>
<td>5 (4.2%)</td>
</tr>
<tr>
<td>Did not respond</td>
<td>1 (0.8%)</td>
</tr>
<tr>
<td>Education level, n (%)</td>
<td></td>
</tr>
<tr>
<td>Elementary school</td>
<td>4 (4.4%)</td>
</tr>
<tr>
<td>High school</td>
<td>9 (7.6%)</td>
</tr>
<tr>
<td>College or trade school</td>
<td>22 (18.6%)</td>
</tr>
<tr>
<td>Some university</td>
<td>29 (24.6%)</td>
</tr>
<tr>
<td>University</td>
<td>40 (33.9%)</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>13 (11.0%)</td>
</tr>
<tr>
<td>Did not respond</td>
<td>1 (0.8%)</td>
</tr>
<tr>
<td>Employment status, n (%)</td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>51 (43.2%)</td>
</tr>
<tr>
<td>Part-time</td>
<td>19 (16.1%)</td>
</tr>
<tr>
<td>Student</td>
<td>32 (27.1%)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>6 (5.1%)</td>
</tr>
<tr>
<td>Retired</td>
<td>2 (1.7%)</td>
</tr>
<tr>
<td>Other</td>
<td>7 (5.9%)</td>
</tr>
<tr>
<td>Did not respond</td>
<td>1 (0.8%)</td>
</tr>
<tr>
<td>Annual household income, n (%)</td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>22 (18.6%)</td>
</tr>
<tr>
<td>$20,000-$40,000</td>
<td>25 (21.2%)</td>
</tr>
<tr>
<td>$40,000-$60,000</td>
<td>24 (20.4%)</td>
</tr>
<tr>
<td>$60,000-$80,000</td>
<td>13 (11.0%)</td>
</tr>
</tbody>
</table>
$80,000-$100,000 12 (10.2)
Greater than $100,000 20 (17.0%)
Did not respond 2 (1.7%)

<table>
<thead>
<tr>
<th>Relationship status, n (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>76 (64.4%)</td>
</tr>
<tr>
<td>Married</td>
<td>21 (17.8%)</td>
</tr>
<tr>
<td>Domestic partnership</td>
<td>14 (11.9%)</td>
</tr>
<tr>
<td>Separated/Divorced</td>
<td>5 (4.2%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>1 (0.8%)</td>
</tr>
</tbody>
</table>

Descriptive Statistics for Key Variables

Descriptive statistics for self-reported executive dysfunction, emotion regulation, gambling motives, gambling frequency, and gambling problems are listed for the total sample in Table 2.

Table 2

Descriptive statistics for key variables in current study (n=118).

<table>
<thead>
<tr>
<th>Variables</th>
<th>M (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Executive Dysfunction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivational Drive</td>
<td>10.30 (2.88)</td>
<td>4-18</td>
</tr>
<tr>
<td>Organization</td>
<td>13.97 (4.20)</td>
<td>5-25</td>
</tr>
<tr>
<td>Strategic Planning</td>
<td>17.17 (4.15)</td>
<td>7-31</td>
</tr>
<tr>
<td>Impulse Control</td>
<td>14.71 (3.96)</td>
<td>6-25</td>
</tr>
<tr>
<td>Empathy</td>
<td>13.14 (3.62)</td>
<td>6-42</td>
</tr>
<tr>
<td>Total Executive Dysfunction</td>
<td>69.30 (11.61)</td>
<td>36-94</td>
</tr>
<tr>
<td><strong>Emotion Dysregulation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonacceptance</td>
<td>15.90 (5.70)</td>
<td>6-30</td>
</tr>
<tr>
<td>Goals</td>
<td>15.16 (4.40)</td>
<td>4-25</td>
</tr>
<tr>
<td>Impulse</td>
<td>15.08 (5.76)</td>
<td>6-30</td>
</tr>
<tr>
<td>Awareness</td>
<td>15.10 (4.11)</td>
<td>4-26</td>
</tr>
<tr>
<td>Strategies</td>
<td>20.51 (7.43)</td>
<td>7-38</td>
</tr>
<tr>
<td>Clarity</td>
<td>12.09 (3.68)</td>
<td>6-21</td>
</tr>
<tr>
<td>Total Emotion Dysregulation</td>
<td>93.73 (24.25)</td>
<td>37-139</td>
</tr>
<tr>
<td><strong>Gambling Motives</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhancement</td>
<td>15.20 (4.67)</td>
<td>5-25</td>
</tr>
<tr>
<td>Coping</td>
<td>11.95 (5.36)</td>
<td>5-25</td>
</tr>
<tr>
<td><strong>Gambling Expectancies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relief Expectancies</td>
<td>34.43 (18.95)</td>
<td>12-84</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Range</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Reward Expectancies</strong></td>
<td>25.20 (6.84)</td>
<td>6-42</td>
</tr>
<tr>
<td><strong>Lifetime Gambling</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gambling Frequency</td>
<td>0.59 (0.40)</td>
<td>0.08-2</td>
</tr>
<tr>
<td>Total Number of Gambling Problems</td>
<td>5.75 (5.19)</td>
<td>0-20</td>
</tr>
<tr>
<td>Total Number of Gambling Types</td>
<td>5.25 (3.01)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

In terms of the gambling characteristics of the sample, it was found on average that participants had engaged in at least 5 different types of gambling activities over their lifetimes. The most common gambling activities endorsed by the sample included purchasing lottery tickets (92% of the sample), gambling at a casino (85% of sample), and playing cards for money (71% of the sample). Participants were also asked about the largest amount of money they had ever gambled with on the SOGS; the majority of the sample indicated they gambled between $10 and up to $100 (35% of the sample) and between $100 and up to $1000 (39% of the sample) in their lifetimes, with 17% of the sample reporting spending over $1000 on gambling in their lifetimes. Gender differences in gambling variables were examined in the current sample given that previous researchers have identified significant gender differences in gambling behaviour, with males more likely to gamble than females (Stoletenberg, Batien, & Birgenheir, 2007). No significant differences were found for lifetime gambling frequency between males ($M=.61, SD=.36$) and females ($M=.56, SD=.44$); $t=.64, p=.53$. In terms of gambling problems, it was found that 11% of the sample may be at risk for potential pathological gambling according to SOGS cut off scores. Men ($M=7.09, SD=5.38$) reported a significantly greater number of lifetime gambling problems than women ($M=4.32, SD=4.63$); $t=2.96, p < .05$. 
First Research Goal

The purpose of the first research goal was to test direct and indirect pathways between executive dysfunction, emotion dysregulation, gambling motives, gambling frequency, and gambling problems.

Bivariate Associations. Bivariate correlation analyses for the key variables involved in the first research goal are listed in Table 3 (Note: the full correlation matrix of variables from Study 1 and Study 2 is included in Appendix E). Significant and positive inter-correlations existed between all key variables pertaining to the first research goal. In particular, executive dysfunction was significantly and positively associated with difficulties with emotion dysregulation. Emotion dysregulation was positively correlated with both coping and enhancement motives to gamble. In turn, both gambling motives were positively associated with gambling frequency as well as gambling problems.

Table 3

Bivariate correlations for key variables involved in the first research goal (n = 118).

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Executive Dysfunction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Emotion Dysregulation</td>
<td>.60**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Coping Motives</td>
<td>.35**</td>
<td>.47**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Enhancement Motives</td>
<td>.32**</td>
<td>.36**</td>
<td>.64**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Gambling Frequency</td>
<td>.28**</td>
<td>.21**</td>
<td>.33**</td>
<td>.33**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Gambling Problems</td>
<td>.38**</td>
<td>.39**</td>
<td>.57**</td>
<td>.54**</td>
<td>.40**</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01

Path Analysis

The path model was constructed to test the hypothesized relationships from: 1) executive dysfunction to gambling problems; 2) executive dysfunction to emotion dysregulation; 3) emotion dysregulation to coping and enhancement gambling motives; 4) gambling motives to
gambling frequency and gambling problems; and 5) gambling frequency to gambling problems (please see Figure 3 for a diagram of the path model). Executive dysfunction was included in the path model as research has highlighted that deficits in executive cognitive functioning are associated with impairments in the adaptive management of emotional states (Schmeichel et al., 2008) and that those with gambling problems have deficits in executive functioning (Ledgerwood et al., 2012). As such, paths were drawn from executive dysfunction to gambling problems and emotion dysregulation, in order to test the direct associations between executive dysfunction and gambling problems as well as between executive dysfunction and emotion dysregulation.

Figure 3. Path model of associations between executive dysfunction, emotion dysregulation, coping and enhancement motives, gambling frequency, and gambling problems. Dotted line represents the direct path from executive dysfunction to gambling problems. Numerical values represent standardized path coefficients.

Next, paths from emotion dysregulation were extended to both coping and enhancement motives in order to test the direct association of emotion dysregulation on mood regulation gambling motives as well as the indirect association between executive dysfunction and
gambling motives through emotion dysregulation. Direct paths from both gambling motives to gambling frequency and gambling problems were also included in the model in order to test direct associations between motives and gambling variables. Indirect paths between emotion dysregulation and gambling outcome variables (i.e., gambling frequency and gambling problems) through gambling motives were also tested. Finally, a direct path from gambling frequency to gambling problems was included to evaluate the direct association between these variables and to support the finding that increased involvement in gambling contributes to increased problems related to gambling (Engwall, Hunter, & Steinberg, 2004; Moore & Ohstuka, 1999).

**Direct Effects.** As illustrated in Figure 3, executive dysfunction was not significantly associated with gambling problems ($B= .060, \beta = .136, SE = .032, p = .061$). Executive dysfunction was significantly and positively associated with emotion dysregulation ($B= 1.258, \beta = .602, SE = .154, p < .001$). Emotion dysregulation was significantly and positively associated with coping ($B= .103, \beta = .465, SE = .018, p < .001$) and enhancement motives ($B= .068, \beta = .355, SE = .017, p < .001$) for gambling. Enhancement motives were significantly associated with gambling frequency ($B=.019; \beta = .303, SE = .007, p = .007$), however coping motives ($B=.004; \beta = .080, SE = .006, p = .475$) were not significantly associated with gambling frequency. Both coping ($B=.320, \beta = .335 SE = .088, p < .001$) and enhancement motives ($B=.228, \beta = .208, SE = .102, p = .026$) were significantly and positively associated with gambling problems. Finally, gambling frequency was significantly and positively associated with gambling problems ($B=4.172, \beta = .232, SE = 1.335, p = .002$).

**Overall Indirect Effects.** With regards to the indirect effects for emotion dysregulation and gambling motives, emotion dysregulation significantly mediated the relationship between
executive dysfunction and coping motives to gamble (B = .129, β = .280, SE = .062, p = .005) as well as enhancement motives to gamble (B = .086, β = .214, SE = .057, p = .003). Coping and enhancement motives in turn, were also found to significantly mediate the relationship between emotion dysregulation and gambling frequency (B = .002, β = .145, SE = .052, p = .005) as well as gambling problems (B = .056, β = .263, SE = .061, p = .011).

Specific Indirect Effects. Tests of the specific indirect effect of both coping motives and enhancement motives on the relationship between emotion dysregulation and gambling frequency as well as gambling problems, revealed that coping motives did not significantly mediate the relationship between emotion dysregulation and gambling frequency (β = .000, 95% CI = [-.001, .001], p = .640). Enhancement motives, however, significantly mediated the relationship between emotion dysregulation and gambling frequency (β = .001, 95% CI = [.000, .003], p = .003). In addition, coping motives significantly mediated the relationship between emotion dysregulation and gambling problems (β = .033, 95% CI = [.008, .053], p = .030). Enhancement motives also significantly mediated the relationship between emotion dysregulation and gambling problems (β = .016, 95% CI = [.003, .038], p = .018).

Model fit. The assessment of model fit, which is determined by the examination of a number of fit indices, is important in determining the extent to which the hypothesized path model fits the sample of observed data (Byrne, 2001). The chi-square statistic tests whether the path model is a good overall approximation of the data with a statistically insignificant chi-square value denoting good model fit. Comparative Fit Index (CFI; Bentler, 1990) and the Root Mean Square Error of Approximation (RMSEA; Steiger & Lind, 1980) were also assessed for indices of model fit. The CFI is based on a comparison of the hypothesized model against a baseline model, typically the independence model where all correlations equal zero. Values for
the CFI range from 0 to 1.00. Values greater than .90 represent a good fit and values greater than .95 reflect an excellent fit. The RMSEA measures the discrepancy between an optimal model with a known population covariance matrix and a hypothesized model with an estimated covariance matrix. The discrepancy is expressed by degree of freedom, and as such the index is sensitive to the complexity of the hypothesized model; values less than .05 typically indicate a good fit (Browne & Cudeck, 1993).

In terms of the fit of the current path model, the chi-square statistic was non-significant indicating good overall fit of the hypothesized model to the current data. The CFI was .991 suggesting excellent fit of the hypothesized model in relation to the baseline model. The RMSEA value for the current path model was .059. MacCallum and colleagues (1996) indicated that values from .08 to .10 denote mediocre to poor model fit; in addition, Hu and Bentler (1999) have suggested a value of .06 to reflect good model fit. Based on this, the RMSEA index for the current path model suggests adequate to good fit as it is somewhat lower than a value of .06 and significantly lower than values reflecting mediocre to poor model fit.

Squared multiple correlations. The squared multiple correlation values for each variable reflect the proportion of variance explained by the predictors of that variable in the path model (Byrne, 2001). Accordingly, it was found that executive dysfunction accounted for 36.3% of the variance of emotion dysregulation the variable. Executive dysfunction and emotion dysregulation accounted for 21.6% of the variance of the coping motives variable and 12.6% of the variance of the enhancement motives variable. Furthermore, executive dysfunction, emotion dysregulation, and gambling motives account for 13.0% of the variance of gambling frequency and 43.7% of the variance of gambling problems.
**Second Research Goal**

The second research goal was to explore the impact of current mood on self-regulation in the context of gambling; that is, the model tested whether mood moderated the indirect relationship between executive dysfunction and gambling expectancies through emotion dysregulation.

*Bivariate associations.* Bivariate correlation analyses for the key variables pertaining to the second research goal are listed in Table 4. Executive dysfunction was significantly associated with emotion dysregulation; both of these variables were significantly associated with relief expectancies, however were not significantly associated with reward expectancies. Negative mood state (i.e., average negative mood ratings for the total sample taken after exposure to mood manipulation) was positively and significantly associated with emotion dysregulation as well as relief expectancies but not reward expectancies. Negative mood was also significantly associated with gambling frequency and gambling problems. Positive mood state (i.e., average positive mood ratings for the total sample taken after exposure to mood manipulation) was inversely significantly associated with executive dysfunction and reward expectancies but was not significantly associated with relief expectancies, emotion dysregulation or either of the gambling variables. Relief expectancies were found to be significantly associated with gambling frequency and gambling problems; however, reward expectancies were not significantly associated with gambling frequency or problems.
Table 4

*Bivariate correlations for key variables involved in the second research goal (n = 118).*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Executive Dysfunction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Emotion Dysregulation</td>
<td>.60*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Negative Mood</td>
<td>.31**</td>
<td>.51**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Positive Mood</td>
<td>-.21*</td>
<td>-.08</td>
<td>-.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Relief Expectancies</td>
<td>.46**</td>
<td>.58**</td>
<td>.60**</td>
<td>.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Reward Expectancies</td>
<td>.13</td>
<td>.08</td>
<td>.02</td>
<td>-.20*</td>
<td>.32**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Gambling Frequency</td>
<td>.28**</td>
<td>.21*</td>
<td>.24*</td>
<td>.10</td>
<td>.41**</td>
<td>-.02</td>
<td></td>
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<tr>
<td>8. Gambling Problems</td>
<td>.38**</td>
<td>.39**</td>
<td>.29**</td>
<td>.05</td>
<td>.55**</td>
<td>.18</td>
<td>.40**</td>
<td></td>
</tr>
</tbody>
</table>

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

*Mood manipulation.* Results of the 2 x 2 repeated measures ANOVA demonstrated a significant interaction between time and mood condition for negative mood \([F (1, 116) = 10.17, p < .05]\) and positive mood \([F (1, 116) = 9.66, p < .05]\). Analysis of simple effects through pairwise comparisons of estimated marginal means (please see Table 5) revealed that for individuals in the negative mood condition, levels of negative affect \((M = 2.25, SD = 1.13)\) significantly increased after exposure to the negative mood story \((M = 2.51, SD = 1.02)\); however, for individuals in the positive mood condition, there was no significant difference between pre \((M = 2.77, SD = 0.27)\) and post ratings of positive affect \((M = 2.88, SD = 0.966)\) after exposure to the positive mood story. Although this was not originally under investigation, it is of interested to note that levels of positive affect \((M = 2.91, SD = 1.05)\) significantly decreased for individuals in the negative mood condition. Additionally, for individuals in the positive mood condition, levels of negative affect \((M = 2.05, SD = 1.10)\) decreased significantly after administration of the positive mood story \((M = 1.84, SD = 1.01)\).
In order to explore the impact of mood on the relationship between executive dysfunction, emotion dysregulation, and gambling expectancies, moderated mediation analyses were conducted. Two separate moderated mediation models were run, one with gambling relief expectancies as the outcome variable and one with gambling reward expectancies as the outcome variable. It was hypothesized that the indirect effect of executive dysfunction on gambling expectancies through emotion dysregulation would be moderated by mood condition. In particular, it was expected that negative mood condition would significantly moderate this indirect effect in comparison to positive mood condition (please see Figure 4 for a diagrammatic representation of the model of the moderated mediation). Emotion dysregulation was proposed as the mediator to further investigate the relationship between executive dysfunction and emotion dysregulation with regards to failures in self-regulation; that is, propensity to engage in high-risk activities such as gambling to avoid negative emotions and/or to boost positive feelings (Ricketts & Macaskill, 2003; Sayette & Griffin, 2004). The literature supports the investigation of this relationship in light of findings indicating that executive dysfunction is associated with difficulties in the capacity to regulate emotions (Schmeichel et al., 2008) which in turn has been linked with increased potential for high-risk activities such as gambling to avoid negative emotions and/or to boost positive feelings (Ricketts & Macaskill, 2003; Sayette &
Griffin, 2011). Gambling expectancies were posited as the outcome variable in order to gauge gamblers’ short-term and impulsive beliefs that gambling would modulate affect in the moment, thereby representing propensity towards short-term maladaptive rewards associated with self-regulation failures. Finally, mood condition was proposed as the moderator in the analyses in order to compare the influence of negative mood versus positive mood with the expectation that negative mood would moderate the mediation of the link between executive dysfunction and gambling expectancies, through emotion dysregulation. Emphasis on investigating negative affect is again supported by theoretical assertions that negative mood states increase the likelihood of failures in self-regulation (Baumeister et al., 1994; Vohs & Baumeister, 2004; Tice, Bratslavsky, & Baumeister, 2001).

**Moderated mediation.** Results indicated that the index of moderated mediation was non-significant for the model with gambling relief expectancies as the outcome variable ($B = -0.100$, $SE = 0.073$, 95% CI [-0.244, 0.040]) and was non-significant for the model with gambling reward expectancies as the outcome variable ($B = -0.166$, $SE = 0.162$, 95% CI [-0.487, 0.141]), indicating that the indirect effect of emotion dysregulation on the relationship between executive dysfunction and gambling expectancies was not conditional on mood condition.

Despite the lack of a moderating effect for negative affect among those in the negative mood manipulation condition, additional exploratory analyses were conducted to investigate the impact of negative mood on self-regulation failures in the context of gambling. These analyses were conducted with the full sample to allow for a more powerful test that included all participants. In this alternative model, a moderated mediation analysis was conducted with negative affect as the moderator instead of mood condition. Average ratings of negative mood after exposure to the mood manipulation (i.e., positive or negative) were included as the
moderator in the analyses in order to ensure higher levels of negative mood were captured. A cross tabulation analysis revealed that the majority of individuals with higher negative mood state were involved in the negative mood manipulation condition (please see Table 6). Scores that were higher than the mid-point (i.e., higher than 2.5) of the negative mood scale after exposure to the mood manipulation (i.e., positive or negative) were included as the moderator in the analyses, in order to ensure higher levels of negative mood were captured and to examine the extent to which high vs. low levels of negative mood influenced the executive dysfunction \( \rightarrow \) emotion dysregulation \( \rightarrow \) gambling expectancies link.

Table 6

*Crosstabulation of mood condition and negative mood.*

<table>
<thead>
<tr>
<th>Mood Condition</th>
<th>Negative Mood</th>
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<tbody>
<tr>
<td></td>
<td>Low ((n))</td>
<td>High ((n))</td>
<td></td>
</tr>
<tr>
<td>Positive ((n))</td>
<td>48</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Negative ((n))</td>
<td>30</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

With regards to the moderated mediation analysis with negative affect as the moderator and gambling relief expectancies as the outcome variable, results indicated that the index of moderated mediation was significant \((B = 0.734, \text{SE} = 0.279, 95\% \text{ CI} [0.265, 1.351])\). Findings also reflected a conditional indirect effect of executive dysfunction on gambling relief expectancies through emotion dysregulation at both levels of the dichotomous moderator, however, the indirect effect was observed to be greater for those with high negative mood \((B = 0.968, \text{SE} = 0.280, 95\% \text{ CI} [0.503, 1.607])\) versus low negative mood \((B = 0.234, \text{SE} = 0.111, 95\% \text{ CI} [0.032, 0.467])\).
Both the positive slope of the index of moderated mediation as well as the increasing magnitude of the indirect effects of emotion dysregulation on the association between executive dysfunction and gambling relief expectancies show that the relationship between executive dysfunction, emotion dysregulation and relief expectancies, was significantly moderated by negative affect. Greater executive dysfunction was associated with greater emotion dysregulation and greater endorsement of gambling relief expectancies for individuals at both high and low negative affect, however, the size of the indirect effect was greater at higher levels of negative affect.

A moderated mediation analyses was also tested with negative mood as the moderator and gambling reward expectancies as the outcome variable, however the index of moderated mediation was not significant ($B = 0.064$, $SE = 0.163$, 95% CI [-.261, .378]), indicating that the indirect effect of emotion dysregulation on the link between executive functioning on gambling reward expectancies was not conditional on negative mood.
Chapter 4: Discussion

The purpose of this study was to evaluate important relationships between factors involved in self-regulation and problematic gambling. Two research questions were assessed in order to explore this relationship. Using path analysis, the first research question involved retrospectively examining how executive dysfunction related to emotion dysregulation, gambling motives, gambling frequency, and gambling-related problems. The second research question examined the application of theoretical models of emotional distress and self-regulation failures to gamblers, by evaluating the prospective impact of current negative affect on the association between executive dysfunction and emotion dysregulation, and whether this was associated with immediate mood-related gambling expectancies. It was hypothesized that executive dysfunction would contribute to increased self-regulation failure in a gambling context, via higher levels of emotion dysregulation, and result in a greater propensity towards endorsing the emotion regulation function of gambling, which would be exacerbated in states of negative mood/emotional distress. The following sections will discuss the findings from this study by addressing results across the two main research questions as well as their theoretical and clinical implications.

**Executive Dysfunction, Emotion Dysregulation, Gambling Motives, and Gambling Pathways**

As hypothesized, there was a positive association between executive dysfunction and emotion dysregulation, indicating that individual differences in executive functioning appear to be associated with increased difficulties in emotion regulation. This finding aligns with the body of literature highlighting the role of top-down cognitive functioning in controlling bottom-up affective processing centres (Ochsner & Gross, 2005; Ochsner et al., 2004). As expected, emotion dysregulation was directly associated with gambling motives to cope with negative...
affect and enhance positive affect, and mediated the relationship between executive dysfunction and these gambling motives, suggesting that individuals with poorer executive functioning were more likely to endorse gambling motives via the mediating influence of emotion regulation difficulties. In other words, it appears that gamblers who have greater difficulty regulating their emotions are more likely to believe that gambling would help to cope with negative emotions and enhance positive emotions. Findings involving the role of emotion dysregulation in the hypothesized model provide valuable contributions to the gambling literature. Although previous studies have found that greater endorsement of emotion regulation motives for gambling contribute to increased gambling frequency and problems (Stewart & Zack, 2008; Stewart et al., 2008), and that greater emotion regulation difficulties are associated with increased gambling problems (Williams et al., 2012), the present study is one of the first to examine these variables concurrently and to establish that emotion dysregulation plays an important role in driving emotion regulation motivated gambling. These results build upon theory and research on the association between emotion regulation and gambling difficulties (Blaszczynski & Nower, 2002; Gupta & Derevensky, 1998; Jacobs, 1986; Williams et al., 2012), by establishing preliminary sequential links between emotion dysregulation and gambling motives and by showing how the interplay between these two factors could lead to gambling problems.

In terms of motivations for gambling, coping motives were directly associated with gambling problems and mediated the relationship between emotion dysregulation and gambling problems. Although enhancement motives were associated with gambling problems to some extent, the association was weaker in comparison to coping motives. In terms of gambling frequency however, enhancement motives were associated with gambling frequency both
directly and as a mediator of the relationship between emotion dysregulation and gambling frequency, whereas coping motives were not associated with gambling frequency. This pattern of findings, where enhancement motives predict gambling frequency and coping motives more strongly relate to gambling problems, is consistent with previous work in the gambling field (Stewart & Zack, 2008; Stewart et al., 2008). These findings also highlight that escape or avoidance of negative affect (i.e., coping motives) is a key contributor to riskier patterns of gambling due to its strong association with gambling problems, which tend to be one of the hallmark indicators of addictive and/or pathological levels of gambling (APA, 2013; Clarke et al., 2007; Stewart & Zack, 2008).

It was expected that executive dysfunction would be directly associated with gambling problems, as executive cognitive abilities have been shown to underlie self-regulation and many studies have documented executive cognitive deficits in problem and pathological gamblers (Ledgerwood et al., 2012; Schmeichel et al., 2008). However, there was no significant direct path from executive dysfunction to gambling problems in the current model. These results suggest that indirect pathways involving emotion dysregulation and mood-related gambling motives are integral to bridging the association between executive dysfunction and gambling problems. As such, it appears that emotion dysregulation stemming from core difficulties with executive functioning contributes to emotion regulation motivations for gambling and thus plays a critical role in explaining the link between executive cognitive dysfunction and problematic gambling.

*Relationships between Impaired Self-Regulation, Negative Mood, and Gambling Expectancies*

The second research question investigated whether being in a negative mood state in comparison to a positive mood state would differentially moderate the indirect relationship
between the independent variable (executive dysfunction) and the outcome variables (gambling expectancies) through the mediator (emotion dysregulation).

Emotion dysregulation was proposed as the mediator to further investigate the relationship between executive dysfunction and emotion dysregulation with regards to failures in self-regulation; that is, propensity to engage in high-risk activities such as gambling to avoid negative emotions and/or to boost positive feelings (Rickets & Macaskill, 2003; Sayette & Griffin, 2004). Additionally, gambling expectancies were posited as the outcome variable in this research question, in order gauge gamblers’ short-term and impulsive beliefs regarding the emotion regulation outcomes involved in gambling, thereby representing propensity towards short-term maladaptive coping strategies associated with self-regulation failures (Tice et al., 2001). Finally, negative mood as the proposed moderator in this analysis, was supported by theory and research regarding the influence of negative mood in increasing the likelihood of failures in self-regulation (Baumeister et al., 1994; Tice et al., 2001; Wagner & Heatherton, 2015).

Two moderated mediation models were tested: one with gambling reward expectancies as the outcome variable and another with gambling relief expectancies as the outcome variable. Contrary to expectations, mood state did not moderate the indirect relationship between executive dysfunction and gambling expectancies through emotion dysregulation. This may be attributed to the fact that although the negative mood manipulation appeared to be effective, it may have not increased negative affect to a level high enough to produce significant results regarding mood condition. In addition, positive mood was not found to significantly increase after the mood manipulation. Because positive mood was viewed as a contrast or control condition, the lack of increase was not of great concern, but may have limited the extent to
which there was any contrast between negative and positive mood, in order to produce a significant moderating effect.

As a result, an alternative exploratory model was run to test the moderating impact of high negative mood versus low negative mood on the indirect link between executive dysfunction and gambling expectancies through emotion dysregulation. Results from this alternative analysis demonstrated that heightened levels of negative mood more strongly moderated the indirect link between executive dysfunction and gambling relief expectancies versus lower levels of negative mood, however this effect of negative mood did not appear to moderate the indirect link between executive dysfunction and gambling reward expectancies.

Overall, these findings suggest that higher levels of negative mood increase the likelihood that individuals will seek out gambling to relieve negative emotional experiences, which may increase gambling problems, given that individuals showed a tendency to more strongly endorse gambling relief expectancies in states of distress, and gambling expectancies have been linked with riskier and more problematic gambling (Stewart & Wall, 2005). Greater endorsement of gambling relief expectancies in this regard may serve as a proxy for assessing risky decision-making in gambling by way of a laboratory-administered gambling task. According to this reasoning, it would follow that higher relief expectancies for gambling would potentially translate into riskier gambling decisions on such a task. Previous studies examining gambling expectancies have in fact established that expectancy driven gambling was associated with placing larger and riskier bets during laboratory-administered gambling tasks (Shead, 2010; Shead & Hodgins, 2009). These results speak to the importance of negative reinforcement contingencies regarding the emotion regulation function of gambling, particularly during heightened emotional distress. As such, findings from this study provide support for gambling
theories emphasizing relief from negative emotions as an important factor in maintaining problematic gambling; in particular, findings around the key role of gambling-related regulation of negative mood reinforce Blaszczynski and Nower’s (2002) conceptualization of the emotionally vulnerable gambling profile as being especially risky for the development and maintenance of problem gambling.

Present findings confirm key research models tested by Tice and colleagues (2001) regarding the aversive impact of emotional distress on self-regulatory control. Indeed, findings from this study demonstrated that higher levels of emotional distress intensified the immediate urge to escape from negative feelings, as evidenced by stronger gambling relief expectancies. Higher inclination toward gambling relief expectancies, as examined by the second research question, also speaks to the related phenomenon of transcendence failure during gambling as described by Baumeister and colleagues (1994), whereby gamblers who yield to their immediate needs and urges, associated with escape from negative affect, abandon healthier long-term self-regulatory goals and thus fail to overcome these urges. Again, current findings extend conceptualizations of self-regulation failure in the context of negative mood described by these authors (i.e., Baumeister et al., 1994; Tice et al., 2001), by showing that heightened emotional distress amplifies transcendence and self-regulation failure via increased difficulty with emotion regulation, precipitated by deficits in executive cognitive functioning.

Results from the second research question also provide support for bidirectional models of executive functioning (i.e., the interaction between cold and hot features of self-regulation; Blaire & Ursache, 2011), as it was found that not only do raw cognitive abilities impact mechanisms in top-down self-regulatory control of affective processes (i.e., link between executive dysfunction, emotion dysregulation, and relief expectancies), but that high emotional
distress also influenced, and in fact worsened, executive control through bottom-up pathways (i.e., high distress intensified the executive dysfunction, emotion dysregulation, and relief expectancy pathway). It would appear that bidirectional mechanisms target emotion dysregulation, reinforcing its role as a mediating mechanism, as gamblers in states of higher distress endorsed greater gambling relief expectancies via their increased emotion regulation difficulties, when compared to less distressed individuals.

Moreover, findings from this study are consistent with gambling research on bidirectional models demonstrating how negative emotions undermine executive functioning associated with top-down self-regulatory control in decision-making around gambling (Ciccarelli, Griffiths, Nigro, & Cosenza, 2017; Navas et al., 2016). Given consistency of current findings with bidirectional models (Blaire & Ursache, 2011) and studies demonstrating the aversive impact of emotional distress on self-regulation in non-gambling as well as gambling contexts (Chester et al., 2016; Ciccarelli et al., 2017; Navas et al., 2016; Tice et al., 2001), the current study lends further theoretical support that heightened emotional distress indeed plays a critical role in undermining the self-regulatory control of gambling through mechanisms described above.

Similar to previous research (Navas et al., 2016; Tice et al., 2001), current findings also add valuable information to the overall research on negative mood and top-down self-regulation. The present results build on Weatherly and Miller’s (2013) work, which examined associations between self-and-emotion regulation (measured by the EFI and DERS), emotional distress, and gambling. However, the current study utilized mood induction procedures and ultimately found that heightened emotional distress exacerbates self-regulation difficulties (i.e., the executive dysfunction-affect dysregulation link). Results across both research questions in this study
support and build on previous theory and literature on self-and-emotion regulation, mood, and gambling (Blaire & Ursache, 2011; Blaszczynski & Nower, 2002; Ciccarelli et al., 2017; Navas et al., 2016; Tice et al., 2001; Stewart & Wall, 2005; Stewart & Zack, 2008; Stewart et al., 2008; Weatherly & Miller, 2013).

Integration of Findings across Research Questions

Taken together, findings from the two research questions provide important information about components of self-regulation involved in the development of problematic gambling. These results draw attention to the importance of emotion regulation in understanding the urge and decision to gamble, thus adding valuable new information to existing theories of self-regulation and gambling.

Findings from the first research question established that pathways from emotion dysregulation to gambling motives are crucial explanatory factors in the link between executive dysfunction and gambling problems. This is particularly true because, contrary to expectations, executive dysfunction did not directly predict gambling problems. These results demonstrate that although executive dysfunction does not directly manifest in gambling problems, it appears to set the stage for emotion regulation motivated gambling linked with potentially riskier gambling patterns (Stewart & Zack, 2008; Stewart et al., 2008).

Present findings on emotion regulation motivated gambling fill gaps in the existing self-regulation and gambling literature, which has typically centered on behavioural aspects of self-regulation (e.g., monitoring behaviour in accordance to pre-set gambling goals; Brevers et al., 2015; Moore et al., 2012). By contrast, results from the present study showcase that the emotion regulation aspect of self-regulation, predicated on executive cognitive functioning abilities, is also important to focus on with respect to explaining problematic gambling. Furthermore, the
establishment of specific paths extending from emotion dysregulation to coping and enhancement gambling motives in the current study confirm literature on motivational models of gambling that convey the importance of emotion regulation motives in maladaptive gambling (Clarke et al., 2007; Goldstein et al., 2014; Lee, Chae, & Lee, 2007; Lloyd et al., 2010; Stewart & Zack, 2008; Stewart et al., 2008). Current findings also fill gaps in motivational models (Lee, Chae, & Lee, 2007; Lloyd et al., 2010; Stewart & Zack, 2008), as it was illustrated that the tendency to endorse emotion regulation gambling motives may be rooted in emotion regulation deficits – a concept that has not been clearly elucidated in the extant gambling literature until now.

Correspondingly, the second research question also highlighted the role of emotion dysregulation as an important explanatory factor in the link between executive dysfunction and expectations about the emotion regulation function of gambling. Findings from the second research question demonstrated that in states of heightened negative mood, individuals who have greater executive cognitive impairment, and thus are more emotionally dysregulated, have stronger expectations that engaging in gambling would relieve negative mood. These results also build upon prior research describing links between negative mood and the activation of mood-related gambling expectancies (Stewart & Wall, 2005), by pointing to emotion dysregulation as a key factor in the interplay between negative mood and greater immediate expectations about the mood-related outcomes of gambling. Taken together, findings across research questions emphasize the integral nature of emotion dysregulation in triggering emotion regulation-related gambling.

The crucial role of negative reinforcement contingencies in gambling is further elucidated by findings from both research questions in this study. Results from the first research
question indicated that problematic levels of gambling are predominantly driven by beliefs around the escape related function of gambling, as coping motives mediated the relationship between emotion dysregulation (predicted by executive dysfunction) and gambling problems. Congruent with the first research question, the second research question also demonstrated that executive dysfunction, through the important influence of emotion dysregulation, is linked to higher expectations that gambling would help alleviate negative mood. The importance of negative reinforcement contingencies in gambling behaviour demonstrated by this study confirm gambling theories centering on escape and avoidance of negative affect in the development and maintenance of problematic gambling patterns (Blaszczynski & Nower, 2002; Jacobs, 1986; Stewart & Wall, 2005; Stewart & Zack, 2008). In their description of various pathways leading to problem gambling, Blaszczynski and Nower (2002) specifically pointed to coping with negative emotions as an important factor for ongoing gambling engagement and noted that this emotionally vulnerable gambling profile may be associated with higher risk for increased gambling problems. Present findings converge with Blaszczynski and Nower’s (2002) theoretical assertions as well as studies that have empirically validated the existence of the emotionally vulnerable gambling profile (Ledgerwood & Petry, 2010; Milosevic & Ledgerwood, 2010; Nower & Blaszczynski, 2017). Current results however, suggest that individual differences in self-and-emotion regulation related to executive dysfunction may also be an important etiological factor to consider in the emotionally vulnerable gambling profile (Blaszczynski & Nower, 2002).

In summary, combined findings across both research questions are consistent with previous research discussing the important role of negative reinforcement contingencies in gambling (Blaszczynski & Nower, 2002; Nower & Blaszczynski, 2017; Rockloff & Dyer, 2006;
Thomas et al., 2011; Stewart & Zack, 2008; Stewart et al., 2008; Stewart & Wall, 2005; Weatherly & Cookman, 2014; Weatherly & Miller, 2013), and add to this research by establishing that greater difficulties with emotion regulation based on executive dysfunction may give rise to higher activation of these contingencies.

Current findings surrounding emotional distress are not only consistent with models on the impact of emotional distress on self-regulatory control (Blaire & Ursache, 2011; Tice et al., 2001) as described above, but also lend support to theory and research regarding characterization of self-control as a limited energy reserve (Baumeister & Heatherton, 1996; Baumeister et al., 1998; Curci et al., 2013; Chester et al., 2016), whereby factors such as emotional distress may diminish the store of finite resources allotted for adaptive coping. The pattern of results from the present study may mirror dynamics described by Baumeister and colleagues (1998), as it was demonstrated that higher states of emotional distress worsen emotion regulation difficulties, perhaps by weakening typical self-regulatory checks and balances geared towards healthier behaviour. Indeed, in states of heightened distress, there was a greater tendency towards viewing gambling as a means to escape this distress. As stated previously, this tendency has been associated with maladaptive coping reflected by increased gambling problems (Shead, 2010; Stewart & Wall, 2005).

Alternative to the limited capacity theory of self-regulation (Baumeister et al., 1998), failures in self-regulation related to maladaptive gambling across both research questions may also be explained by Hall and Fong’s (2007) temporal self-regulation theory and delay-discounting models of behaviour (Reynolds, 2006). These theories emphasize the salience of short-term rewards in contributing to maladaptive behaviour and describe how temporally proximal outcomes more strongly influence behaviour versus longer-term outcomes or
consequences. The theory of temporal self-regulation describes how impaired self-regulation increases the likelihood that individuals will give into short-term rewards associated with maladaptive behaviour; furthermore, studies investigating delay-discounting have established emerging links between greater delay-discounting and poorer executive cognitive control (Weatherly & Ferraro, 2011; Clark, Kassman, Derenne, & Weatherly, 2014). Current findings documenting associations between increased ratings of coping and relief related gambling contingencies in those with greater executive impairment provide support for theory and research around the allure of short-term contingencies of gambling (Alessi & Petry, 2003; Hall & Fong, 2007; Ledgerwood et al., 2003; Reynolds, 2006; Weatherly & Ferraro, 2011). In line with temporal theories of behaviour, gamblers with greater executive dysfunction in the current study may also be more likely to discount potential for future problems related to their gambling or ignore their adaptive long-term goals and gambling limits given the immediately reinforcing nature of emotion regulation contingencies for gambling (Hall & Fong, 2007; Reynolds, 2006).

Present findings also correspond to the broader emotion regulation literature base documenting how impairments in regulating internal distress often lead to maladaptive responses to emotions, such as engagement in unhealthy or externalizing behaviours (Campbell-Sills & Barlow, 2007; Cheetham, Allen, Yucel, & Lubman, 2010; Compass et al., 2015; DeBellis, 2001; Gratz & Roemer, 2004; Gratz & Tull, 2010; Williams et al., 2012). According to this literature (specifically, Gratz & Roemer, 2004; Gratz & Tull, 2010), propensity to engage in unhealthy coping mechanisms may be a byproduct of key features of emotion dysregulation, including emotional non-acceptance, lack of access to effective coping mechanisms, and difficulty with goal-directed behaviours during states of emotional distress (Gratz & Roemer, 2004; Gratz & Tull, 2010). Present findings add to the literature base (Gratz & Roemer, 2004;
Gratz & Tull, 2010; Williams et al., 2012) by showing that greater emotional distress may further impact these key aspects of emotion dysregulation in order to create an increased risk for maladaptive coping in the context of problem gambling. Results from this study provide additional support to literature investigating the role of executive functioning, self-and-emotion regulation, and maladaptive coping (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Modecki, Zimmer-Gembeck, & Guerra, 2017; Nigg, 2017) by demonstrating that the relationship between emotion dysregulation and maladaptive coping may be precipitated by core difficulties with executive functioning.

**Theoretical and Clinical Implications**

The current study established important findings that addressed omissions in the existing theory and literature on self-regulation and gambling, and as such, the results of this investigation have a number of theoretical implications which will further inform our current understanding of the development and maintenance of problematic gambling patterns. In particular, the results of this study suggest that theoretical models of self-regulation and gambling which do not consider the important roles of emotional distress or emotion regulation in problematic gambling are insufficient, and that these factors should be integrated into these models for increased completeness and accuracy.

Existing models of self-regulation and gambling tend to focus on cognitive (i.e., distortions such as gambler’s fallacy) and behavioural (i.e., planning, decision-making, monitoring, goal-and-limit setting) aspects of self-regulation, however, they do not describe the role of emotional self-regulation in their conceptualization of risky decision-making in gambling (Sharpe, 2002; Baumesiter, Heatherton, & Tice, 1994). Findings from the current study indicate that the modulation of emotions is involved in decision-making around gambling. Motivations
and impulses to avoid or escape distress could interfere with adaptive limit-setting during gambling as well as the ability to adhere to these limits. Although the literature suggests that the self-regulation of behaviour and the self-regulation of emotion as two fairly distinct entities, findings from this study reinforce emerging literature on the important interconnections between these processes (Ciccarelli et al., 2017; Weatherly & Miller, 2013), potentially inspiring even further integration of these domains in future investigation and understanding of gambling behaviour.

Present results also have important implications for emotion regulation theories of gambling such as motivational models of gambling (Stewart & Zack, 2008; Stewart et al., 2008) and Blaszczynski and Nower’s (2002) conceptualization of the emotionally vulnerable problem gambling profile. Although these above-mentioned models discuss the importance of the emotion regulation function of gambling, present results add valuable information about factors that potentially give rise to emotion regulation motivated gambling, namely an impaired internal ability to regulate emotions derived from executive cognitive deficits. Findings from the current study show that the self-regulation of gambling is not only linked to individual differences in the ability to effectively regulate emotions, but that high levels of emotional distress further compromise top-down self-regulatory control of emotions via negative reinforcement contingencies, which were found to bear particularly heavily in emotion-regulation motivated gambling. Motivational models of gambling (Stewart & Zack, 2008; Stewart et al., 2008) and Blaszczynski and Nower’s (2002) conceptualizations would benefit from theoretical revisions to acknowledge the pivotal role of emotion dysregulation in contributing to emotion regulation motivated gambling and should consider executive cognitive dysfunction as a potential precipitating factor in the development and maintenance of gambling problems.
With respect to clinical implications, current findings have a number of important applications for gambling prevention and treatment. Given the role of executive functioning in emotion regulation and gambling, poor executive functioning may serve as an early marker for future development of gambling problems. Gamblers exhibiting signs of poor goal-setting, planning, monitoring, and decision-making may benefit from early intervention strategies aimed at strengthening executive cognitive abilities and subsequently self-regulatory control in order to offset development of harmful and severe gambling patterns. Goal Management Training (GMT), designed and validated for remediation of executive dysfunction (Levine et al., 2011; Robertson, Levine, & Manly, 2005) in conjunction with mindfulness-based meditation was shown to be effective in improving executive cognitive abilities such as decision-making and response inhibition in those with alcohol-use problems, which authors indicated had important implications for gambling treatment outcome and relapse (Alfonso, Caracuel, Delgado-Pastor, & Verdejo-Garcia, 2011). In light of the demonstrated efficacy of GMT in those with addictive behaviours, it appears that training in executive cognitive functioning may have strong utility for preventing gambling problems and for improving treatment outcomes in individuals at-risk for developing problematic patterns of gambling. For example, increasing self-regulatory strength through executive cognitive training, as described above, may also strengthen gamblers’ abilities to set adaptive and realistic goals or limits for gambling, and allow them to monitor their thoughts and behaviours in order to adhere to these goals (Brevers et al., 2015).

Given the strong link between executive dysfunction and emotion dysregulation, it would follow that enhancement of executive cognitive abilities would likely improve emotion regulation skills. Developing greater emotional control may also work to offset problematic gambling patterns driven by emotion regulation motivated gambling. Mindfulness-based
meditation, Cognitive Behavioural Therapy, as well as Mindfulness Based Cognitive Therapy have all been established as effective treatments for problem gambling (DeLisle, Dowling, & Allen, 2012; McIntosh, Crino, & O’Neil, 2016). Internalization of adaptive emotion regulation strategies using these interventions would be particularly helpful during states of high emotional distress or negative affect. Gamblers may also benefit from learning distress tolerance skills, which could help to quell the immediate intensity and aversive impact of negative affect on emotion regulation processes and allow for more effective and goal-directed coping. Preliminary evidence has established the benefits of distress tolerance in those struggling with addiction issues (Bornovolova et al., 2012), and therefore distress tolerance may serve as a promising future direction for treatment in those with gambling problems.

Findings from the current study also have relevant implications for prevention strategies, which include raising awareness about the potential risks of emotion regulation motivated gambling, particularly during periods of emotional distress. Prevention could also focus on early interventions for those at risk of developing gambling problems, including youth with histories of trauma or childhood maltreatment, those with family histories of gambling or other addictive disorders, and those in high-risk development phases such as emerging adulthood, which have all been linked with an elevated risk for engaging in potentially addictive behaviours such as gambling (Arnett, 2004; 2005; Jacobs, 1989). These early preventative efforts could again involve cognitive training (e.g., GMT) to improve executive functioning and could incorporate an emphasis on teaching adaptive emotion regulation and distress tolerance skills in order to strengthen self-regulatory ability. It is hoped that these preventative measures will veer individuals away from developing problematic emotion regulation motivated gambling.
Limitations and Future Directions

Although the current findings address important gaps in the gambling literature, as with all studies there were some research limitations. The relatively small sample size in the current study may have limited statistical power for detecting significant effects, resulting in fewer or less robust relationships than what may actually exist in the population. For example, a significant direct effect between executive dysfunction and gambling problems may have been observed with the aid of greater statistical power. The smaller sample size also limited the ability to test for gender differences in the analyses. As such, future directions for this research could involve replication with a larger sample size, allowing for examination of gender differences in the models. A larger sample size would also allow for greater generalizability of the study findings to the broader population of community gamblers. Levels of emotion dysregulation in the current sample were higher than the community sample used to validate the DERS (Gratz & Roemer, 2004); number of gambling problems in this study were also higher than the average number of gambling problems reported by a previous sample of community gamblers (Stewart & Wall, 2005). Had there been a bigger sample in the current study, perhaps levels of emotion dysregulation and gambling problems in the current sample would be more similar to other samples of community gamblers in the extant literature, rendering present findings more representative. Furthermore, as the current sample was composed of community-recruited gamblers, future replication with a clinical sample of pathological gamblers may also provide deeper insight into factors involved in the etiology and maintenance of addictive gambling.

The majority of questionnaires utilized in the present study involved retrospective self-reports; the accuracy and validity of retrospective self-reports are dependent on factors such as
respondents’ memory, attention, item interpretation, introspective ability, and social desirability (Hodgins et al., 2010). Rather than using a self-report measure of executive functioning, objective measures of executive functioning (e.g. neuropsychological measures of working memory, planning, decision-making, etc.) may have allowed for a stronger assessment of executive functioning as these measures are designed to tap into raw cognitive abilities. In addition, although the gambling expectancies questionnaire provided a prospective measure of respondents’ immediate reactions and beliefs regarding mood regulation outcomes of gambling, this measure was a proxy for a real-life gambling task; administration of such a gambling task would enhance the ecological validity of these findings by directly examining gambling related decision-making. Alternatively, due to the bias involved with sole usage of self-reports, inclusion of ‘other’ or informant reports for assessment of executive functioning could have enhanced the validity and representative nature of participants’ executive functioning scores (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

The purely online nature of the study somewhat restricted the ability to gather informant reports and administer objective executive functioning measures and real-life gambling tasks. To this end, future studies should consider including informant reports of executive functioning for increased accuracy and validity and should consider administering objective measures of executive functioning and gambling in laboratory settings in order to increase ecological and construct validity and enrich understanding of how executive dysfunction impacts self-regulation and gambling behaviour, particularly in situations of immediate emotional distress.

Similarly, options for the nature and type of mood manipulation that could be used in the present study were limited to written materials due to the online nature of the survey platform. An experimental lab-based study paradigm could have afforded the use of stronger mood
manipulation techniques, which may have produced more robust emotional distress and states of negative mood in which gambling models could be more aptly tested. In previous experimental studies investigating negative affect and self-regulation failures, images, music, or movie clips were commonly used to generate increased states of negative mood (Wagner & Heatherton, 2015). In particular, musical mood induction procedures have been demonstrated to be efficient and effective in altering mood states in experimental settings (Vastfjall, 2002) and have been used in previous laboratory research investigating the impact of mood on gambling expectancies (Stewart & Wall, 2005). As such, in conjunction with more objective measures of executive dysfunction and gambling as described above, future studies should consider utilizing experimental laboratory paradigms, allowing for stronger mood manipulation techniques, such as musical mood induction procedures, to more precisely and powerfully investigate the impact of negative mood states on self-regulatory failure in a gambling context.

The cross-sectional research design speaks to another important limitation in the present study, as it constrains the ability to make inferences regarding causal and directional relationships between executive dysfunction, emotion dysregulation, and gambling-related regulation of negative affect; it would be beneficial to test current hypotheses in a longitudinal manner in order to elucidate causal and directional associations among these variables. With respect to longitudinal designs, future research could consider employing ecological momentary assessment (or experience sampling methodologies). This approach would provide repeated assessments of participants current behaviors and experiences in real-time and real-world contexts over longer periods of time and would have the added benefit of strengthening the ecological validity of the research findings (Shiffman, Stone, & Hufford, 2008). Experience sampling has been used effectively in previous studies investigating mood and emotion-
regulation related gambling (Goldstein et al., 2014); thus, future extensions of the current research should take advantage of these methods in order to gather invivo assessments of mood, emotion regulation gambling contingencies, and gambling behaviour.

Despite aforementioned limitations there are undoubtedly a number of important strengths associated with this study, including novel and valuable research contributions that fill omissions in the existing self-regulation and gambling literature, together with compelling theoretical and clinical implications as described above. In particular, it is hoped that the present findings will advance our theoretical understanding of factors contributing to problematic gambling and inform prevention and treatment aimed towards thwarting the onset and development of gambling disorders.
References


emotional impulsiveness and ADHD symptoms to adaptive impairments in major life activities. *Journal of ADHD Related Disorders, 1*, 5–28.


gambling problems, drinking problems, and affective motivations for drinking.


Williams, R. J., Hann, R.G., Schopflocher, D., West, B., McLaughlin, P., White, N., King, K. &


Appendices
PARTICIPANTS NEEDED
For an ONLINE STUDY on MOOD, GAMBLING, & GOAL-DIRECTED BEHAVIOUR

SEEKING PARTICIPANTS:

✓ 19 years of age or older
✓ Gambled at least 2 times in the past month

Online survey will take approximately 25-30 MINUTES to complete

If you are interested in participating in the online gambling survey, please contact Preeyam Parikh

This study has been reviewed by, and received ethics clearance through the Office of Research Ethics, University of Toronto

When you complete the survey, you will be given the option to receive a five-dollar amazon electronic gift certificate, in appreciate of your time
Appendix B
Informed Consent Form

**Consent to Participate in a Research Study**
The purpose of an informed consent form is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent form must provide sufficient information so you have the opportunity to decide if you would like to participate in the study.

You are being invited to take part in a research study being conducted by Preeyam Parikh who is a Ph.D. student at OISE/University of Toronto. Preeyam is being supervised by Dr. Abby Goldstein, who is an Associate Professor at OISE/University of Toronto.

Your participation in this study is voluntary and you may withdraw from the study at any time. The study is described below. This description includes information about the risks, inconvenience, or discomfort that you might experience. Participating in the study might not benefit you directly, but the goal of the research is to help us better understand gambling behaviour so that we can use this information to help others.

**Title of Study**
Investigating the roles of executive functioning and self-regulation in gambling

**Investigators**
**Student Researcher: Preeyam Parikh, M.A., Ph.D. Candidate**, Department of Applied Psychology and Human Development OISE/University of Toronto

**Faculty Supervisor: Dr. Abby Goldstein, Ph.D., C.Psych.,** Department of Applied Psychology and Human Development OISE/University of Toronto

**Purpose**
- The purpose of this study is to better understand people’s patterns and reasons for gambling by exploring factors that may be related to gambling such as the ability to regulate one’s own behaviours and emotions
- By identifying factors that might be associated with gambling we hope to develop better ways of working with individuals who have problems with gambling
- We hope that a total of 180 adults will participate in this study

**Who can participate in this study**
You may participate in this study if you:
- Are 19 years of age or older.
- Gambled at least 2 times in the past month

**What you will be asked to do**
- If you choose to participate in this research study, you will be asked to complete a series of online surveys that ask questions about how often you gamble, any problems you have
experienced with gambling, your reasons for gambling, your patterns of goal-directed behaviour, your mood, and how you deal with your emotions

- The entire survey will take approximately 25-30 minutes to complete
- As a token of appreciation, you will have the option to receive a $5 Amazon.ca gift card upon completion of the study

**Right to Refuse**

- Participation is completely voluntary, and you are under no obligation to agree to participate in this study
- You have the right to withdraw from the research at any time or skip any questions that you find objectionable without explanation or penalty
- If you choose to withdraw from the study during the online survey, simply click on the “withdraw” button at the bottom of each screen or you may simply close your browser to exit the survey and withdraw from the study. Because your data is anonymous, once you have completed the survey and submitted it online, you will no longer be able to withdraw your data.
- If you choose to withdraw before study completion, data from any questionnaires you filled out will be permanently deleted and will not be used for any data analyses

**Possible Risks and Discomforts**

- Although there are no known risks with participating in this study, it is possible that you may feel uncomfortable answering questions about your previous gambling experiences and reasons for gambling
- During this survey you will be asked to read a story designed to either induce mild negative mood or positive mood and this might lead some individuals to feel uncomfortable or upset
- You may skip certain questions or portions of the survey that you do not wish to answer
- Again, you may withdraw from the study at any time by simply clicking on the “withdraw” button at the bottom of each screen or you may simply close your browser to exit the survey and withdraw from the study
- At the end of the survey we will provide you with the contact information for places you can go or access to get support for gambling problems, as well as information about other support services
- You will still receive the list of resources should you withdraw early from the survey; you may also contact the investigators to request the list of resources

**Possible Benefits**

There may be benefits to participating in this study:

- You might learn something new about your reasons for gambling and/or how your mood is related to your gambling
- Having a list of resources and information on gambling problems may be helpful to you now or in the future
- Your participation in this study will help increase our understanding of gambling behaviour so that we can develop new ways to help people who have gambling problems

**Compensation**
In appreciation for your participation and your time, you will be given the option to receive a $5 Amazon.ca gift card upon completion of the survey.

**Confidentiality**
- All information will be kept secure and confidential and no identifying information will be collected, except for your email address should you choose to receive the $5 Amazon.ca gift card, which will not be linked with your survey data and will be deleted upon study completion.
- Because no identifying information will be collected (i.e., your data will be completely anonymous), it will not be possible to withdraw your data once you have completed the survey and submitted it online.

**Other Information**
If you are interested in obtaining a brief report of the results, please let us know by contacting the research investigators at the email addresses below.

**Questions**
Should you have any questions or concerns about this study, or if any issues arise because of your participation, please feel free to contact the student investigator or her faculty supervisor.

Should you have any questions about your rights as a research participant, please feel free to contact the Office of Research Ethics at the University of Toronto:
- Office of Research Ethics, University of Toronto
- Tel: (416) 946-3273
- E-mail: ethics.review@utoronto.ca

Below you will be prompted to indicate if you wish to participate in this study. Please click “I Consent” if you have read the above form and understand the conditions of your participation, that your participation in this study is voluntary, that the information you share is anonymous and confidential, that if for any reason, at any time, you wish to leave the study you may do so without having to give an explanation and with no penalty whatsoever, and you are 19 years of age or older.

Please print this screen if you would like a copy of this page for your own records.

☐ I Consent  ☐ I Do Not Consent/Exit
Appendix C
Online Questionnaire

Brief Screening Questions and Demographic Items

Brief Screen Questions:

1. What is your age? ______

2. How many times have you gambled in the past 30 days? ______

Demographic Items:

What is your gender?

- Male
- Female

How would you describe your ethnicity? (Select one):

- Indigenous (e.g., First Nations, Metis)
- Caucasian/White
- South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
- East Asian (e.g., Chinese, Japanese, Korean, etc.)
- South East Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese, etc.)
- Filipino
- Latin American
- West Indian/Caribbean (e.g., Guyanese, Trinidadian, etc.)
- African Canadian (e.g., African, Haitian, Jamaican, Somali, etc.)
- Middle Eastern (e.g., Armenian, Egyptian, Iranian, Lebanese, Moroccan, etc.)
- Multiethnic
- Other (please specify) ______

What is your marital status?

- Single
- Married
- Domestic Partnership
- Separated
- Divorced
- Widowed

What is your highest level of education? (Please select one)

- Grade School
- High School Diploma or GED
- College or Trade School
☐ Some University
☐ University undergraduate degree
☐ Post graduate degree

What is your current employment status?
☐ Employed full-time (30 or more hours/week)
☐ Employed part-time (less than 30 hours/week)
☐ Unemployed (out of work but looking for work)
☐ Student employed part-time or full-time
☐ Student not employed
☐ Retired
☐ Homemaker
☐ Other (please specify) ______

What was your total household income, before taxes, last year? That would be the household income before taxes and from all sources for all persons in your household.
☐ Under $20,000
☐ $20,000-$30,000
☐ $30,000-$40,000
☐ $40,000-$50,000
☐ $50,000-$60,000
☐ $60,000-$70,000
☐ $70,000-$80,000
☐ $80,000-$90,000
☐ $90,000-$100,000
☐ $100,000-$120,000
☐ $120,000-$150,000
☐ More than $150,000
Appendix C
Online Questionnaire

Executive Functioning Index (Spinella, 2005)

Please rate how well each of the following statements describe you by choosing the appropriate number from the scale beside each item.

<table>
<thead>
<tr>
<th></th>
<th>Statement</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Very Much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I have a lot of enthusiasm to do things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>When doing several things in a row, I mix up the sequence.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>I try to plan for the future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>I can sit and do nothing for hours.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>I take risks, sometimes for fun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>I have trouble when doing two things at once, multi-tasking.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>I'm interested in doing new things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>I have a lot of concern for the well being of other people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>I'm an organized person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>I save money on a regular basis.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>I do or say things that others find embarrassing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>People who are foolish enough to be taken advantage of deserve it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>I only have to make a mistake once in order to learn from it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>I tend to be an energetic person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>I make inappropriate sexual advances or flirtatious comments.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>When someone is in trouble, I feel the need to help them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>I sometimes lose track of what I'm doing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>18.</td>
<td>I feel protective towards a friend who is being treated badly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>19.</td>
<td>I think about the consequences of an action before I do it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20.</td>
<td>I lose my temper when I get upset.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>21.</td>
<td>I take other people's feelings into account when I do something.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>22.</td>
<td>I have trouble summing up information in order to make a decision with it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>23.</td>
<td>I start things, but then lose interest and do something else.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>24.</td>
<td>I swear/use obscenities.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>25.</td>
<td>I don’t like it if my actions or words hurt someone else.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>26.</td>
<td>I use strategies to remember things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>27.</td>
<td>I monitor myself so that I can catch any mistakes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Appendix C
Online Questionnaire

Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004)

Please indicate how often each of the following statements apply to you by choosing one of the options from the scale.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Almost never</th>
<th>Sometimes</th>
<th>About half the time</th>
<th>Most of the time</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I am clear about my feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>I pay attention to how I feel.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>I experience my emotions as overwhelming and out of control.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>I have no idea how I am feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>I have difficulty making sense out of my feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>I am attentive to my feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7.</td>
<td>I know exactly how I am feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8.</td>
<td>I care about what I am feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9.</td>
<td>I am confused about how I feel.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10.</td>
<td>When I’m upset, I acknowledge my emotions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11.</td>
<td>When I’m upset, I become angry with myself for feeling that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12.</td>
<td>When I’m upset, I become embarrassed for feeling that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13.</td>
<td>When I’m upset, I have difficulty getting work done.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14.</td>
<td>When I’m upset, I become out of control.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Statement</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>15.</td>
<td>When I’m upset, I believe that I will remain that way for a long time.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16.</td>
<td>When I’m upset, I believe that I will end up feeling very depressed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17.</td>
<td>When I’m upset, I believe that my feelings are valid and important.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18.</td>
<td>When I’m upset, I have difficulty focusing on other things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19.</td>
<td>When I’m upset, I feel out of control.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20.</td>
<td>When I’m upset, I can still get things done.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21.</td>
<td>When I’m upset, I feel ashamed at myself for feeling that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22.</td>
<td>When I’m upset, I know that I can find a way to eventually feel better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23.</td>
<td>When I’m upset, I feel like I am weak.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24.</td>
<td>When I’m upset, I feel like I can remain in control of my behaviors.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25.</td>
<td>When I’m upset, I feel guilty for feeling that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26.</td>
<td>When I’m upset, I have difficulty concentrating.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27.</td>
<td>When I’m upset, I have difficulty controlling my behaviors.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28.</td>
<td>When I’m upset, I believe there is nothing I can do to make myself feel better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29.</td>
<td>When I’m upset, I become irritated at myself for feeling that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30.</td>
<td>When I’m upset, I start to feel very bad about myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>31.</td>
<td>When I’m upset, I believe that wallowing in it is all I can do.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>When I’m upset, I lose control over my behavior.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>33.</td>
<td>When I’m upset, I have difficulty thinking about anything else.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>34.</td>
<td>When I’m upset I take time to figure out what I’m really feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>35.</td>
<td>When I’m upset, it takes me a long time to feel better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>36.</td>
<td>When I’m upset, my emotions feel overwhelming.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix C
Online Questionnaire

Barratt Impulsiveness Scale Short Form (Spinella, 2007)

Please rate how well each of the following statements describe you by choosing one of the options from the scale:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Rarely/Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I plan tasks carefully.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>I do things without thinking.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>I don't &quot;pay attention&quot;.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>I concentrate easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>I save money on a regular basis.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>I squirm at plays or lectures.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>I am a careful thinker.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>I plan for job security.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>I say things without thinking.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>I act &quot;on impulse&quot;.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>I get easily bored when solving thought problems.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>I act on the spur of the moment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>I buy things on impulse.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>I am restless at lectures or talks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>I plan for the future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix C
Online Questionnaire

South Oaks Gambling Screen (Lesieur & Blume, 1987)

This section is about GAMBLING or BETTING MONEY. This includes betting money on games and activities such as cards (e.g., poker, blackjack, etc.), table games (e.g., Roulette, etc.), slot machines, lotteries and instant scratch tickets, bingo, dice, races, horses or other animals, playing the stock and/or commodities market, sporting events, raffles, and skill-based games (e.g., pool, darts, bowling, golf, etc.)

1. Please indicate which of the following types of gambling you have done in your lifetime. For each type, mark one answer: "not at all," "less than once a week," or "once a week or more."

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all</th>
<th>Less than once a week</th>
<th>Once a week or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Played cards for money</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b) Bet on horses, dogs, or other animals (in off-track betting, at the track, or with a bookie)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c) Bet on sports (parlay cards, with a bookie, or at jai alai)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d) Played dice games (including craps, over and under, or other dice games) for money</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e) Went to casino (legal or otherwise)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f) Played the numbers or bet on lotteries</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>g) Played bingo</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>h) Played the stock and/or commodities market</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>i) Played slot machines, poker machines, or other gambling machines</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>j) Bowled, shot pool, played golf, or played</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
2. What is the largest amount of money you have ever gambled with on any one-day?
   - [ ] Never gambled
   - [ ] $1.00 or less
   - [ ] More than $1 up to $10
   - [ ] More than $10 up to $100
   - [ ] More than $100 up to $1,000
   - [ ] More than $1,000 up to $10,000
   - [ ] More than $10,000

3. Do (did) your parents have a gambling problem?
   - [ ] Both my father and mother gamble (or gambled) too much
   - [ ] My father gambles (or gambled) too much
   - [ ] My mother gambles (or gambled) too much
   - [ ] Neither one gambles (or gambled) too much

4. When you gamble, how often do you go back another day to win back money you lost?
   - [ ] Never
   - [ ] Some of the Time (less than half the time I lost)
   - [ ] Most of the Times I Lost
   - [ ] Every Time I Lost

5. Have you ever claimed to be winning money gambling, but weren’t really? In fact, you lost?
   - [ ] Never
   - [ ] Yes, less than half the time I lost
   - [ ] Yes, most of the time

6. Do you feel you have ever had a problem with gambling?
   - [ ] No
   - [ ] Yes, in the past, but not now
   - [ ] Yes

7. Did you ever gamble more than you intended to?
   - [ ] Yes
   - [ ] No

8. Have people criticized your betting or told you that you had a problem, regardless of whether or not you thought it was true?
   - [ ] Yes
9. Have you ever felt guilty about the way you gamble, or what happens when you gamble?
   □ Yes
   □ No

10. Have you ever felt like you would like to stop gambling, but didn’t think you could?
    □ Yes
    □ No

11. Have you ever hidden betting slips, lottery tickets, gambling money, IOUs, or other signs of betting or gambling from your spouse, children or other important people in your life?
    □ Yes
    □ No

12. Have you ever argued with people you live with over how you handle money?
    □ Yes
    □ No

13. (If you answered “Yes” to question 12) Have money arguments ever centered on your gambling?
    □ Yes
    □ No

14. Have you ever borrowed from someone and not paid them back as a result of your gambling?
    □ Yes
    □ No

15. Have you ever lost time from work (or school) due to betting money or gambling?
    □ Yes
    □ No

16. If you borrowed money to gamble or to pay gambling debts, who or where did you borrow from (check “Yes” or “No” for each):

   a. From household money
      _____ Yes _____ No
   b. From your spouse
      _____ Yes _____ No
   c. From other relatives or in-laws
      _____ Yes _____ No
   d. From banks, loan companies, or credit unions
      _____ Yes _____ No
   e. From credit cards
      _____ Yes _____ No
f. From loan sharks
   _____ Yes _____ No

g. You cashed in stocks, bonds or other securities
   _____ Yes _____ No

h. You sold personal or family property
   _____ Yes _____ No

i. You borrowed on your checking accounts (passed bad checks)
   _____ Yes _____ No

j. You have (had) a credit line with a bookie
   _____ Yes _____ No

k. You have (had) a credit line with a casino
   _____ Yes _____ No
The Gambling Motives Questionnaire (Stewart & Zack, 2008)

The following is a list of reasons people give for gambling. Thinking of all the times you gamble, how often would you say that you gamble for each of the following reasons? Please rate the frequency you think you gamble for the following reasons by checking a numbered column box on the 5-point scale below.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Almost never/ Never</th>
<th>Some of the time</th>
<th>Half of the time</th>
<th>Most of the time</th>
<th>Almost always /Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>As a way to celebrate.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>To Relax.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Because you like the feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Because it’s what most of your friends do when you get together.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>To forget your worries.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Because it’s exciting.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>To be sociable.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Because you feel more self confident or sure of yourself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>To get a “high” feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Because it is something you do on special occasions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Because it helps when you are feeling nervous or depressed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>11.</td>
<td>Because it’s fun</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12.</td>
<td>Because it makes a social gathering more enjoyable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13.</td>
<td>To cheer up when you’re in bad mood</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14.</td>
<td>Because it makes you feel good</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix C
Online Questionnaire

Pre-Mood Manipulation Mood Items

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, that is, at the present moment.

<table>
<thead>
<tr>
<th></th>
<th>Very slightly/Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>Quite a Bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cheerful</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Sad</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Glad</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Depressed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Pleased</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Blue</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Happy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix C
Online Questionnaire

Randomization Item

When is your birth month?

Select "January to June" if your birth month is in the first half of the year OR select "July to December" if your birth month is in the second half of the year then click "Next" to get to the next page:

☐ January to June

☐ July to December
Appendix C
Online Questionnaire

Positive Mood Story (Erber, 1991)

Please read the following story carefully:

Sharon Clemens lived with her mother and 4 brothers in Doddville Tennessee, a small town in the Smoky Mountains. Sharon took care of most of the household chores and cooked when her mother worked late. Mrs. Clemens had taken a job as a produce clerk when her husband died. Sharon was 14 at the time.

A serious girl, Sharon often wondered what it would be like to live in a big city and to see all the things she read about in back issues of magazines they let her mother bring home from Doctor Simmon's office. Sharon would fancy herself as an illustrator of children's books filled with beautiful landscapes and friendly animals.

Drawing was the only thing that distracted Sharon from her homework or domestic chores. She liked to draw her mother and brothers at home in the evenings after the chores were done. Sharon wouldn't hear of letting her mother buy her any art supplies so she drew with pencils and pieces of charcoal she saved. Her dream was to buy an enormous set of colored pencils someday, pencils with every imaginable color.

Mrs. Clemens knew her daughter had talent, but didn't think the renderings of herself and her boys would ever sell. She also knew that if Sharon didn't get any formal training her talent would never amount to much more than a hobby, one to be put aside when she had her own children to raise.

The thought of selling some of Sharon's sketches occurred again to her as she rode the bus into Knoxville one day to visit her sister. Mrs. Clemens always brought along a few of Sharon's drawings. They seemed to tell of the boys and their antics much better than she could. Sharon was a senior in high school at the time and talking about working in the grocery store, maybe saving money for community college. Mrs. Clemens hoped that she would still find time to draw her and the boys.

A woman seated across from her on the bus seemed to be eyeing the drawings with interest. Mrs. Clemens held them up for her to see. The other patrons on the bus began to take notice and chuckling at Andy dressing up the cat, or Gus and Joe playing the banjo and singing.

The woman introduced herself as Mrs. Henderson. She was an art dealer in Knoxville and hoped to have a closer look at some of Sharon's work. Mrs. Clemens accompanied her back to her store where Mrs. Henderson gave her $75 for the sketches, a large pad of drawing paper and a box of colored pencils. She told her to have Sharon fill in the pad and bring it and the girl back with her.

Sharon's work was exhibited at the Knoxville Blossom Festival that spring. As her mother had hoped, the colored pencils opened up a whole new range of possibilities for Sharon who spent much of her spare time away from the house drawing the mountains' colorful landscapes, animals and birds.

Sharon's drawing of apple trees blossoming against a backdrop of mountains won the poster design competition and was seen on advertisements all over town. Her drawings did not
go unnoticed by the local artists’ community, one of whom was an artist in residence at the University of Virginia.

Without telling Sharon, she spoke to the school of admissions about possible scholarships for the girl. When Sharon was contacted by a Mr. Conrad who liberally praised her work and asked her to come down for an interview, she was terribly nervous. How could she make it through the interview? Her grades were not that good.

Mr. Conrad was able to make Sharon relax a little in the interview. She even laughed as he showed her the industrious attempts of his own young son to draw the mountains. He explained to Sharon that if she did get the scholarship, they would help her prepare for academics with a special summer program.

Four weeks later, her letter of acceptance arrived from the University of Virginia. A full scholarship to study art. She was in.
Appendix C
Online Questionnaire

Negative Mood Story (Erber, 1991)

Please read the following story carefully:

Sharon Clemens was a bright, articulate sophomore, majoring in art at the University of Michigan. She felt sorry for students who deliberated over their majors. Art was such an obvious choice for her. From an early age Sharon photographed, painted, and drew. Almost nothing else could keep her attention. History was boring, as were science and English. Her only desire was to be able to explain the physical world with her artwork, to translate things that struck her into paintings and drawings and photographs.

Sharon received a great deal of praise for her work in high school. Her water color paintings of Tennessee mountain dwellers who lived near her home in Knoxville were Sharon's favorite subjects and drew critical acclaim when exhibited at a local art gallery.

She sold every painting, donating the proceeds to a medical center whose purpose was to give aid to those isolated and poverty-stricken families. Sharon loved walking through the mountains and, in time, learned all the steep and winding paths that led to the homes she visited.

When the time came for her to go to college, Sharon felt torn. It made her sad to think how little she would see her family and her friends in the mountains over the next few years. But she resolved to come back, to paint, photograph, and maybe help them lead better lives.

Her first year of college was a great challenge, but she emerged as one of the promising artists in her class. The second year of school Sharon moved out of the dorm into an apartment and bought a big yellow labrador she named Sheba.

As a substitute for her long walks in the mountains. Sharon walked everywhere with Sheba: to and from her classes on North Campus, to visit friends and to various parks in the city.

That January, Sharon was settling back into her apartment and trying to adjust to the rigors of another semester. School, it seemed both exhausted and invigorated her. Her friends laughed at her seriousness and tried to get Sharon to go easier on hers. But Sharon wouldn't have known how. This semester, however, things were different. She seemed to get cramped sitting for long periods of time and when she tried to stretch out she felt pain. Sharon dismissed the idea that anything was wrong with her, but in the spring she found she had trouble walking to campus. Her knee and ankle joints were tender.

Friends insisted that she see a doctor. But Sharon feared in her heart that there really was something wrong with her, something terrible, and she refused to go. It was not until she was no longer able to hold a pencil or a brush, or even push the shutter on her camera that she agreed.

The doctors confirmed her fears. Sharon had developed rheumatoid arthritis, a condition normally found in much older patients. The painful inflammation of her joints would leave her an invalid. None of the doctors told her this, but Sharon had read all the literature she could find on the disease and learned that this rare condition was progressive. Sharon realized that soon, it would be virtually impossible to work for more than a few moments with her hands, to walk more than a short distance, in essence to do anything she had built her life around.
Sharon believed that her talent was an inexplicable gift. But she had taken for granted that she would always have the use of her body. Didn't she have a right to one that worked? Now she would have to learn to live in continual pain. Even worse than the physical pain was the realization that she could no longer use her gift, the one thing that had made her special, made her important to the rest of the world. She would never be able to run again with Sheba or paint her friends in the mountains.
Appendix C
Online Questionnaire

Post-Mood Manipulation Mood Items

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, that is, at the present moment.

<table>
<thead>
<tr>
<th></th>
<th>Very slightly/Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>Quite a Bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cheerful</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Sad</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Glad</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Depressed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Pleased</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>Blue</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>Happy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>
The Gambling Expectancies Questionnaire (Stewart & Wall, 2005)

Please indicate how much you agree or disagree with each of the following statements about what you would expect to happen if you gambled right now, by circling a number on a scale of 1 (Strongly Disagree) to 7 (Strongly Agree). The closer you place your circle to one end or the other indicates the strength of your agreement or disagreement. Please complete every item. We are interested in how you are thinking or feeling right now as you are filling out the questionnaire.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th></th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gambling would not be pleasant right now.</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>2. I would feel better if I could gamble.</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>3. Gambling would be wonderful.</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>4. I would feel less jittery if I gambled right now.</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>5. Gambling would make things seem just perfect</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>6. I would feel more in control of things right now if I could gamble</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>7. Gambling would make me feel less jittery</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>8. Nothing would be better than gambling right now</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>9. Gambling would be ideal</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>10. I would feel less irritable if I gambled now.</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>11. Gambling would not be very satisfying right now</td>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---</td>
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</tr>
<tr>
<td>12.</td>
<td>If I gambled right now, I would feel less tense.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>I would not enjoy gambling right now.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>It would be great to gamble now.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>I would feel less restless if I gambled now</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>If I were gambling now, I would feel less nervous</td>
<td></td>
<td></td>
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<tr>
<td>17.</td>
<td>Gambling would not make me content</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Gambling would put me in a better mood</td>
<td></td>
<td></td>
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</tbody>
</table>
### RESOURCE SHEET FOR GAMBLING AND SELF-REGULATION STUDY

#### National Gambling and Mental Health Resources

**Web Databases**

- **Canadian Centre on Substance Abuse: Treatment Services**
  Search for treatment services relating to gambling and drug use across Canada using this database.
  
  **Website:**
  [http://www.ccsa.ca/Eng/Topics/SubstancesAndAddictions/Gambling/Pages/default.asp](http://www.ccsa.ca/Eng/Topics/SubstancesAndAddictions/Gambling/Pages/default.asp)

- **Canada Alcohol and Drug Rehab Programs**
  Provides a free online directory of alcohol, drug, and gambling rehabilitation programs across Canada.
  
  **Website:**
  [http://www.canadadrugrehab.ca/](http://www.canadadrugrehab.ca/)

- **eMentalHealth.ca**
  You can search for resources (e.g., helplines) across Canada using this database.
  e.g., Search: *Type in* > “Telephone Crisis Lines”; *Where: Type in* > Name of your Province
  
  **Website:**
  [http://www.ementalhealth.ca/](http://www.ementalhealth.ca/)

**Web Forums**

- **GamTalk**
  GamTalk offers free online forum community where people can support each other by sharing their ideas and experiences with gambling issues. This website offers many resources also including helpline phone numbers and online self-help tools.
  
  **Website:**
  GamTalk Online Forum Availability: 24 hours/day, 7 days/week

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### Ontario Gambling and Mental Health Resources
ConnexOntario
Free provincial helplines through which Information and Referral Specialists provide confidential and anonymous support, health information, and referral services (including contact information for services and supports within the caller’s community if requested) relating to problems with gambling, alcohol, other drugs, and mental health over the phone or via website chat.

Tel:
- Ontario Problem Gambling Helpline: 1-888-230-3505
- Drug and Alcohol Helpline: 1-800-565-8603
- Mental Health Helpline: 1-866-531-2600

Availability (for all the above): 24 hours/day, 7 days/week

Website:
http://www.connexontario.ca/

Ontario Problem Gambling Helpline: http://www.opgh.on.ca/
Drug and Alcohol Helpline: http://www.drugandalcoholhelpline.ca/
Mental Health Helpline: http://www.mentalhealthhelpline.ca/

Availability (for all the above): 24 hours/day, 7 days/week

Problem Gambling Institute of Ontario
Provides contact information for useful resources and services relating to problem gambling.

Websites:
http://www.problemgambling.ca/Pages/Home.aspx
http://www.problemgambling.ca/EN/WebSiteLinks/Pages/CanadianResources.aspx

Telephone Helplines

Gerstein Crisis Centre Telephone Call Line
Free, voluntary, and confidential crisis intervention service over the phone and in-person, 24 hours a day, 7 days a week.
Tel: 416-929-5200

Distress Centre Telephone Call Line
Crisis line offering free services for individuals in distress who require urgent emotional care and for individuals who have been physically or sexually assaulted or who are at risk of being assaulted

Tel:
- Distress Centre Central: 416-598-0166
- Distress Centre North York: 416-486-3180
- Distress Centre Scarborough: 416-439-0744
- Distress Centre Peel: 905-278-7208

Mental Health Service Information Ontario (MHSIO)
Information about mental health services and supports in communities across Ontario
Tel: 1-866-531-2600
Website: www.mhsio.on.ca

Questions/Concerns About Study
Should you have any questions or concerns about the study (“Investigating the roles of executive functioning and self-regulation in problematic gambling”), or if any issues arise because of your participation, please feel free to contact this study’s student investigator or her faculty supervisor
Appendix E
Full Correlation Matrix for Study Variables

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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<tbody>
<tr>
<td>1. Executive Dysfunction</td>
<td></td>
<td>0.60**</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>2. Emotion Dysregulation</td>
<td>0.35**</td>
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<td>0.47**</td>
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<td></td>
<td></td>
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<tr>
<td>3. Coping Motives</td>
<td>0.32**</td>
<td>0.36**</td>
<td>0.64**</td>
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<tr>
<td>4. Enhancement Motives</td>
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<tr>
<td>5. Relief Expectancies</td>
<td>0.13</td>
<td>0.08</td>
<td>0.22*</td>
<td>0.21*</td>
<td>0.32**</td>
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<tr>
<td>6. Reward Expectancies</td>
<td>0.31**</td>
<td>0.51**</td>
<td>0.49**</td>
<td>0.32**</td>
<td>0.60**</td>
<td>0.02</td>
<td></td>
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<td>7. Negative Mood</td>
<td>-0.21*</td>
<td>-0.08</td>
<td>0.04</td>
<td>-0.02</td>
<td>0.10</td>
<td>-0.20*</td>
<td>-0.14</td>
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<td>8. Positive Mood</td>
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<tr>
<td>9. Gambling Frequency</td>
<td>0.28**</td>
<td>0.21**</td>
<td>0.33**</td>
<td>0.33**</td>
<td>0.41**</td>
<td>-0.02</td>
<td>0.24*</td>
<td>0.10</td>
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<tr>
<td>10. Gambling Problems</td>
<td>0.38**</td>
<td>0.39**</td>
<td>0.57**</td>
<td>0.54**</td>
<td>0.55**</td>
<td>0.18</td>
<td>0.29**</td>
<td>0.05</td>
<td>0.40**</td>
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<tr>
<td>11. Impulsivity</td>
<td>0.71**</td>
<td>0.66**</td>
<td>0.38**</td>
<td>0.42**</td>
<td>0.40**</td>
<td>0.73</td>
<td>0.30**</td>
<td>-0.14</td>
<td>0.28**</td>
<td>0.37**</td>
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</tbody>
</table>

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