THE RELATIONSHIP OF GAMBLING GOALS AND LOSS/WIN CONDITIONS TO CHASING BEHAVIOR DURING SLOT MACHINE PLAY

By JAMES LISTER

A dissertation submitted to the

Graduate School-New Brunswick

Rutgers, the State University of New Jersey

In partial fulfillment of the requirements

For the degree of

Doctor of Philosophy

Graduate Program in Social Work

Written under the direction of

Lia Nower

And approved by

New Brunswick, New Jersey

JANUARY, 2014

ABSTRACT OF THE DISSERTATION

THE RELATIONSHIP OF GAMBLING GOALS AND LOSS/WIN CONDITIONS TO CHASING BEHAVIOR DURING SLOT MACHINE PLAY By JAMES LISTER

Dissertation Director:

Lia Nower

The influence of decision-making processes on risky forms of gambling behavior has been relatively unexplored. One of these processes, goal setting, may be of particular relevance, because many gamblers cite winning money as a primary motivating force for play. This dissertation explored the relationship of goal setting (subjective and objective forms) to chasing behavior. In addition, this study examined for differences in response to loss/win conditions, as well as demographic and dispositional variables. To test this hypothesis, a sample of university students was recruited (N = 121), all of who completed a survey battery and gambled on a virtual reality slot machine. All participants were provided with \$20 with which to gamble, played the slots for 30 spins (roughly 5 minutes), and then were provided with an opportunity to continue or discontinue play. The decision to continue play and the number of subsequent chasing spins were the two dependent measures of interest. Males reported higher subjective goals, were more likely to decide to chase, and chased for more spins. Separate multiple logistic and multiple linear regressions were conducted to predict decision to chase and the number of chasing spins among the overall sample and by separate gender analyses. Among the overall

sample, male status, degree of subjective goals, and the degree of problem gambling severity were all positively related to decision to chase and chasing spins in preliminary analyses; only male gender remained a significant predictor in both multivariate analyses. Among the female subsample, the degree of subjective goals predicted both forms of chasing behavior in preliminary and multivariate analyses, while problem gambling severity predicted decision to chase in preliminary analyses. Among the male subsample, there were no significant predictors for decision to chase or the number of chasing spins. These results demonstrate that subjective goals may play an important role in chasing behavior, particularly as a discriminating factor among females. The influence of objective goals and loss/win conditions failed to demonstrate relationships with chasing behavior. Implications for responsible gambling, social work policy and practice, and directions for future research will be discussed.

Acknowledgements

I would like to extend my appreciation for the support I have received during this process to a few different groups of people who have been vital in helping me stay focused, keep believing in my work, and help foster a positive trajectory in a field where many become intimidated and disconnected. First and foremost, I have been extremely fortunate to work with my dissertation chair and mentor, Dr. Lia Nower, for the past five years. She has helped me learn the discipline required to turn an idea from an internal conceptualization of my mind into definable constructs, how to design and conduct a variety of forms of research, and how best to navigate a path towards the future I desire in the field of academia. Her effort and tutelage has taken me from a lay philosopher most comfortable with park bench discussions into someone much more capable of making an impact on the field, and ultimately better served to help those afflicted with mental health difficulties. Her experience and reputation in the field of gambling research helped facilitate my ability to attain dissertation funding and to make connections with scholars throughout North America and beyond. In essence, her mentorship helped to open doors in virtually any direction I felt would be most authentic for me to pursue, and for that I will be forever grateful. The faculty at Rutgers' School of Social Work helped me transition into the next level of scholarship throughout my coursework and our qualifying examinations, in particular I am gracious to my committee members, Dr. Kathleen Pottick and Dr. Chien-Chung Huang for their help in organizing and structuring my dissertation, reminding me that I am a social worker scholar, and keeping me on task with the largest piece of work I have ever been involved with. In addition, Dr. Judith Bear, Dr. Darcy Seibert, and Dr. Beth Angell, and Dr. Allison Zippay were all great mentors during

iv

my time at Rutgers. I also experienced a sense of connection and shared experience with some of my other Rutgers colleagues, i.e., Svetlana Spiegel, Kristen Gilmore-Powell, Kerrie Ocasio, Cory Morton, Alexander Cheryomukhin, Nadine Murshid, and Kyle Caler.

I was also lucky enough to get work in Ottawa for a year and learned more than I could have imagined from my external committee member and Canadian advisor, Dr. Michael Wohl. He made every effort possible to ensure my continued intellectual growth, helped me become an improved writer, and served as a mentor to the existentialism inherent to career decision making. I also received very impactful feedback on writing and academic work from Carleton's Dr. Chris Davis. The sports betting project I worked on with Michael and Chris will always be a cherished memory of mine. In addition to the Carleton faculty, my lab mates, i.e., Justin McManus, Travis Sztainert, Erinn Squires, Danay Novoa, Nathalie Gillen, Mallory Calderwood, and Lindsey Kawatra were of great support and commiseration during all of our data collection and statistical analysis days spent at the Social Sciences Research Building. I am thankful that I have been able to reach this stage in my academic career, and would have never dreamed of achieving some of my goals without the exposure to a life in research from Dr. Joe Himle, Dr. Steve Taylor, and Dr. Emily Stern during my time at University of Michigan's Department of Psychiatry. Joe helped guide me along a course of research before I knew what research even meant, and the three years working closely with Steve and Emily showed me how much there was still left to learn, something that has helped continue to foster my openness to intellectual growth. Lastly, there have been many days where the overwhelming nature of research has left me frustrated, and I would have never

v

completed this process without my family and close friends. My father inspired me to dream about science, my mother always kept me optimistic and championed my love of numbers from a young age, and my sister's shared love of mental health knowledge offered me a great connection to talk about my work.

I would also like to acknowledge the assistance to me provided by the Ontario Problem Gambling Research Centre, Carleton University, and the Fulbright Canada Educational Exchange Program. They helped to fund this project and me throughout this period, making this end result possible. I would like to formally extend my appreciation to both as they allowed for me to be a part of exciting and meaningful research.

Table of Contents

ABSTRACT OF THE DISSERTATIONii
Acknowledgementsiv
List of Tablesxii
Chapter 1: Introduction1
Statement of the Problem1
Background of the Study2
Theoretical Rationale4
The Present Study6
Research Questions7
Practical Implications for Social Work7
Chapter 2: Literature Review10
Background10
Classification and Prevalence11
Demographic Factors14
The Phenomenon of Chasing16
Game Type18
The Effect of Prior Losses/Wins20
Responsible Gambling22
Limit-Setting & Limit-Adherence22
Machine Features, Warning Messages, & Smart Cards24

Unintended Consequences of Responsible Gambling Practices	28
Theoretical Framework: Decision Making & Goal Setting	30
Other Positive Outcome Motivations for Play	
Behavioral Approach and Inhibition and Gambling Behavior	
Chapter 3: Method	
Research Questions	43
Design and Procedures	46
Sampling Strategy	46
Ethics Process	47
Recruitment	47
Consent	48
Data Collection	48
Study Protocol	49
Measurement Reliability & Validity	58
Subjective Goal Setting Scale	58
Objective Goal Setting Condition	59
Gambling Expectations Item	60
Loss/Win Condition	60
Behavioral Approach and Behavioral Inhibition Scales	61
Gender	62
Problem Gambling Severity	62
Ethnicity	62
Chasing	63
Interaction Terms	64

Methods of Analysis65
Chapter 4: Results72
Preliminary Analyses72
Age and Gender72
Problem Gambling Severity72
Gambling Expectations for Play73
Ethnicity74
Subjective Goal Setting77
Objective Goal Setting Condition78
Loss/Win Condition78
Behavioral Approach and Behavioral Inhibition80
Chasing and Problem Gambling Severity (CPGI)84
Other Predictors and Chasing85
Multiple Logistic Regression Models Predicting Decision to Chase
Overall Sample Logistic Regression91
Multiple Logistic Regression Analyses Predicting Decision to Chase Among Males94
Multiple Logistic Regression Analyses Predicting Decision to Chase Among Females96
Multiple Linear Regression Models Predicting Chasing Spins (Ln)
Multiple Linear Regression Analyses Predicting Chasing Spins (Ln) Among the Overall
Sample
Multiple Linear Regression Analyses Predicting Chasing Spins (Ln) Among the Male
Subsample
Multiple Linear Regression Analyses Predicting Chasing Spins (Ln) Among the Female
Subsample

Results Summary105
Chapter 5: Discussion
Implications for Social Work Policy and Practice112
Directions for Responsible Gambling Practices112
Implications for Social Work Policy & Practice113
Limitations115
Directions for Future Research & Conclusions118
References
Appendix A: Announcement for Recruitment (SONA System)
Appendix B: Informed Consent132
Appendix C: Debriefing135
Appendix D: Informed Consent to the Use of Data141
Appendix E: Canadian Problem Gambling Inventory (CPGI)143
Appendix F: Gambling Expectations Item and Subjective Goal Setting Scale 145
Appendix G: Demographic Information147
Appendix H: Behavioral Approach and Behavioral Inhibition Scales149
Appendix I: General Assessment/Deception Funnel152
Appendix J: Experimental Protocol Script153
Appendix K: Experimental Protocol Checklist159
Appendix L: Enumerated Data Tracking161

Appendix M: Perseverance Phenomenon Script	
Appendix N: Objective Goal Setting Script A	
Appendix O: Objective Goal Setting Script B	166
Appendix P: Casino Scripts	167
Appendix Q: Rideau River Slot Machine Payout Table	
Appendix R: VR Worlds	170
Appendix S: Fulbright Canada Student Award	171
Appendix T: Carleton University Letter of Invitation	

List of Tables

Table 1 Study measurement variables	. 55
Table 2 Predictor and dependent variable table	. 57
Table 3 Level of problem gambling severity status by gender and ethnicity among the	
overall sample	.76
Table 4 Level of decision to chase by objective goal setting condition and loss/win	
condition	. 79
Table 5 Means and standard deviations for chasing spins, subjective goals, behavioral	
inhibition, and behavioral approach by gender and level of problem gambling severity	
status	. 82
Table 6 Level of decision to chase by level of problem gambling severity among the	
overall sample	. 87
Table 7 Level of decision to chase by level of problem gambling severity among male	
participants	. 88
Table 8 Level of decision to chase by level of problem gambling severity status among	5
female participants	. 89
Table 9 Logistic regression predicting decision to chase with and without interaction te	erm
among the overall sample	. 93
Table 10 Logistic regression predicting decision to chase with and without interaction	
term among the male subsample	. 95
Table 11 Logistic regression predicting decision to chase with and without interaction	
term among the female subsample	.97

Table 12 Linear regression predicting chasing spins (Ln) with and without interaction	
term among the overall sample	100
Table 13 Linear regression predicting chasing spins (Ln) with and without interaction	
term among the male subsample	102
Table 14 Linear regression predicting chasing spins (Ln) with and without interaction	
term among the female subsample	104

Chapter 1: Introduction

This chapter will discuss the problem of chasing behavior in recreational and disordered gambling, the theoretical backdrop of goal setting as a predictor of chasing, the background of responsible gambling practices and limit-setting, the present study including a broad overview of research questions, and implications for social work policy and practice.

Statement of the Problem

This dissertation will examine goal setting as a vulnerability factor for one form of risky play, chasing behavior, among a sample of university-aged gamblers. Chasing behavior has been associated with severe financial consequences and criminal behavior among disordered gamblers and may result as both a strategy to recoup losses or a strategy targeted on garnering more wins after experiencing a big win or string of wins. Chasing has been identified as a symptom that discriminates levels of gambling severity, but the relationship between goal setting and chasing behavior has yet to be evaluated.

The field of disordered gambling has turned to responsible gambling practices in recent years as a strategy to reduce gambling-related harm that may occur in response to chasing and other risky forms of gambling behavior (e.g., frequent gambling, exceeding one's limit). "Chasing," a term used in the gambling literature to refer to the practice of repeatedly returning to gambling as a way of winning more or recouping losses, has been associated with severe financial consequences and criminal behavior among disordered gamblers, and has been identified as a symptom that discriminates levels of gambling severity.

Responsible gambling approaches, which include limit-setting and limitadherence, warning and pop-up messages, and smart cards with responsible gambling features, are theoretically designed to arrest the progression of excessive gambling that is characterized by chasing and fueled by cognitive distortions suggesting the ability to control otherwise random events. These strategies attempt to reduce risk by increasing awareness of the negative consequences associated with risky forms of play (e.g., playing for a longer period of time than intended, not understanding the random nature of gambling). However, to date, the efficacy of responsible gambling strategies have produced mixed and inconclusive findings. Despite insufficient empirical support, some jurisdictions have mandated responsible gambling programs such as limit-setting on cards and machines for casino players. These programs, often costly for jurisdictions to enable, are of uncertain utility, as some of the research indicates that responsible gambling strategies could increase rather than decrease player interest in chasing in the face of losses. In addition, the strategies employed to date have all but ignored the motivations for chasing during play, relying on questions about general motivation to gamble rather than motivation to chase during a losing session. The latter information, informed by the variables that influence individual decision making under conditions of risk, could provide important information for the development of more efficacious responsible gambling practices.

Background of the Study

Most gamblers endorse the desire to win money or to have fun as the primary motivations for gambling. In contrast, a majority of responsible gambling strategies aimed at limit-setting ask the gambler to shift their focus from reward-seeking to risk aversion. This shift may be particularly problematic for disordered gamblers, who are more likely than recreational gamblers to gamble for sensation or reward seeking or to escape negative emotions through gambling. The focus of the gambler then is primarily on what they can get from gambling (e.g. more time in a pleasant emotional state) than on what gambling can cost them. As a result of this focus, financial losses and gamblingrelated harm often present as unintended consequence of their play, especially for individuals who gamble more frequently, play with larger sums of money, or set goals to win a high dollar value in their play.

To date, most research in the area of responsible gambling has focused on implementing interventions or policy initiatives aiming to help recreational and disordered gamblers minimize their gambling losses. One avenue that has been explored frequently among slot machine players in recent years is that of limit-setting and pop-up reminder messages. These practices have typically asked players to identify their limit before beginning play either in how much money they were willing to lose or how much time they were willing to spend playing. Reminder messages of their pre-selected limits would then "pop up" on the screen as the limit approached. Such practices in limit-setting are theorized to increase the player's awareness of their bottom line, thereby increasing the likelihood that they will adhere to their limits. There have been some positive results in the field of limit-setting, though the literature warrants considerably more investigation. The most problematic finding regarding limit-setting, however, is that the majority of players don't set limits, even less adhere to limits, and the players that state they are the least likely to set and adhere to limits are the players the most likely experience gambling-related harm. The field of responsible gambling has taken the latter

finding (i.e., disordered players rarely set limits) as support for emphasizing limit-setting among these vulnerable players, i.e., these players need limits more so than those already setting limits. However, this dissertation will investigate the opposite position: that these players need an altogether different responsible gambling intervention, one emphasizing the language of goal setting and positive outcome focus in future responsible gambling approaches. Specifically, this dissertation will explore whether messaging and other forms of limit-setting should emphasize a different motivational focus – goal setting – because players may be more receptive to messages focusing on positive outcomes rather than those that emphasize limiting one's play. It is possible that limit-setting messages may work well for recreational gamblers who want to gamble within prescribed limits, however, for disordered gamblers, they are likely to breed resentment and incite workaround strategies.

This foundational research is the first exploration of goal setting among gamblers, and will thus warrant more replication, particularly with regard to level of problem gambling severity, in future research. Findings from this dissertation will help inform future responsible gambling strategies regarding the relationship of goal setting to chasing behavior, and, ultimately assist in the development of more consistent and effective harm reduction strategies.

Theoretical Rationale

Goal setting is one of many decision-making processes that have been studied in the field of behavioral economics. A majority of projects in that field have used gambling tasks to study how different decision-making processes function, though the gambling tasks were not designed to test these processes (e.g., goal setting) among disordered gamblers. Tasks used in the behavioral economics literature typically ask participants to make decisions about a variety of different gambles offered to them but are not representative of play or player decisions in a typical gambling environment. The results from these projects have used gambling tasks solely to elicit findings in the fields of cognitive science, social/personality psychology, and decision-making processes. Applying decision-making paradigms to the field of gambling studies will provide seminal information about how individuals make decisions under risky conditions and provide valuable information about the role of harm to the public's health from slot machine play and the gambling industry at large – both of which have seen rapid and widespread expansion and significant increases in availability and accessibility over the last decade.

Gambling goals for play may serve as a motivational factor that predisposes gamblers to take more risks during play. Typically people who set higher goals in nongambling domains are more likely to put forth more effort and persistence in the interest of achieving their goal. In this respect, a higher degree of gambling goals may result in an increased likelihood of deciding to chase both wins and losses (more effort) and an increased likelihood to chase for more spins (increased persistence). The purpose of this study is to first identify whether or not gamblers set goals for their play, and second, whether or not those goals predict risky gambling behavior, i.e., chasing behavior. Specifically, the author theorizes in this dissertation that goal setting will be a key motivational factor that will result in an increased likelihood of deciding to chase and result in more money lost after chasing for more spins. This dissertation will measure goal setting in both subjective (self-report) and objective (experimentally manipulated) forms. In addition, the study will control for losses and wins as well relevant demographic and dispositional factors (i.e., gender, ethnicity, behavioral approach and inhibition, problem gambling severity) to assess for relevant interactions and subgroup differences.

The effect of recent losses and wins (conducted in an experimental setting free of recall bias) on chasing behavior will provide important information to the gambling field. The information will provide future studies a more detailed understanding of how chasing behavior is influenced by the loss/win scenario in terms of the decision to chase, the number of spins played, and whether any demographic or dispositional factors influence the relationship between goal setting, loss/win condition, and chasing behavior.

The Present Study

This study is the first to investigate the role of goal setting in a controlled laboratory setting using an immersive virtual reality slot machine program and to use random assignment to experimental and control goal-setting conditions (objective goal setting). In addition, the study enrolled a similar number of participants to experience either nominal wins or nominal losses, thereby allowing for an investigation of the interactions between goal setting, losses or wins, and chasing behavior.

This exploration will fill a theoretical gap in both the gambling and the goalsetting literature, which has traditionally focused on scholastic, athletic, and career achievement. Neither the gambling nor the goal-setting literature has examined potential maladaptive outcomes of goal setting such as contributing to chasing despite serious adverse consequences. Looking at the manner in which goals could lead someone astray or contribute to poorer health has been relatively unexplored in any maladaptive domain, let alone the field of disordered gambling. The gambling environment is one area where setting goals may be maladaptive to the individual. This would also be the first project to use a goal-setting framework in an actual gambling environment. Within the field of disordered gambling, there haven't been any direct investigations of gambling goals and their relationship to harm. The motivational literature currently relies on a variety of cross-sectional projects that ask participants what their primary motivations are for play, and the relationship of those motivations to disordered gambling and gambling-related harm. Positive outcome motivations (e.g., playing for reward) are the closest proxies of goal setting in the field of gambling motivations. Findings from this study will have important implications for conceptualizing the role of goal setting in different contexts including gambling.

Research Questions

This dissertation will examine the following research questions: Whether higher subjective goals (trait-based, self-report) versus level of objective goals (state-based, experimentally manipulated) result in more frequent chasing and higher degrees of chasing spins (RQ. 1); whether an experience of prior losses versus prior wins results in more frequent chasing and higher degrees of chasing spins (RQ. 2); whether the significant variables identified in preliminary analyses prove predictive of decision to chase and chasing spins in multiple logistic and linear regressions for the overall sample, and by separate analyses conducted by gender (RQ. 3).

Practical Implications for Social Work

This dissertation will provide policy and practice implications for the discipline of social work. Future projects can then investigate whether adapting responsible gambling

messages to reflect goal setting helps improve existing responsible gambling practices. These modifications could include asking gamblers what their goal is prior to play and then providing information about the likelihood of winning that amount of money or achieving that goal, or providing messages that compel players to set a lower or secondary goal for play that is easier to attain. Instead of asking players to set a limit, something most disordered gamblers are unlikely to do on their own, pop-up reminder messages could be provided that influence a player's goal to become less risky. These findings could also have implications in the treatment domain, where recent work has shown that harm-reduction approaches, i.e., allowing disordered gamblers to continue gambling albeit with less money risked than prior to treatment, have shown success among gamblers that refused to engage in abstinence-based treatment. Harm-reduction approaches focus less on the risk of gambling than do abstinence-based approaches, and as a result, provided treatment to a cohort previously understood as treatment-resistant and beyond the reach of the treatment sector. In this respect, the identification of goal setting as a process that predisposes gamblers to risky forms of play could provide information to help tailor treatment protocols one step further. That it to say, once a gambler is in treatment, their clinician could provide treatment with a more informed understanding of gambling motivations and attempt to shape or move those motivations (goals) to a more responsible or healthier domain, as opposed to introducing new motivations (limits). From a policy perspective, these findings could help point towards increased regulation of gambling advertisements or messages put forth by the casino industry that attempt to inflate the expectations or goals that gamblers have for play. Recommendations could be made to constrain the goal level, e.g., "you can win

\$100,000" to "you can win \$100", or minimize the use of exact monetary values altogether, e.g., "you can win big" over an exact amount that sets a specific and challenging goal. This project may also provide valuable understanding on which subgroups are the most vulnerable to endorse goal-setting motivations and chase. In this manner, the project may paint a clearer picture on which individuals may be the most vulnerable or in need of prevention and intervention efforts from the field of social work.

Chapter 2: Literature Review

This chapter will include the theoretical framework for the present study as well as a review of the relevant empirical literature to help understand the relationship between goal setting, prior losses and wins, and chasing behavior. This chapter will also review literature on responsible gambling and limit-setting practices. In addition, this chapter will review other important demographic and dispositional factors that may also influence goal setting and chasing behavior.

Background

Gambling is common throughout the United States and North America; studies have estimated that 80 to 95% of people have gambled during their lifetimes (NORC, 1999; Shaffer, Hall, & Vander Bilt, 1999; Welte, Barnes, Wieczorek, Tidwell, & Parker, 2001). The spread of legalized gambling in the 1990s coincided with increased participation in gambling activities (NORC, 1999). Prior to the expansion of gambling availability, lifetime gambling was reported by 68% of adults in a U.S. prevalence study (Kallick, Suits, Dielman, & Hybels, 1976), however, by 1998, 86% of Americans in a similar study reported participating in some form of gambling (NORC, 1999).

In the United States, 48 states have some form of legalized gambling, including casino gambling. In recent years, and especially following the economic recession of the late 2000s, jurisdictions have frequently turned to the casino industry as a means of achieving short-term economic growth (Eadington, 1999; Wiley & Walker, 2011), though the costs and benefits to the community (Grinols & Mustard, 2006; Walker, 2007; Walker & Jackson, 2007), and the attendant public health concerns (Korn & Shaffer, 1999; Shaffer & Korn, 2002) are still in debate. Emerging online and mobile gambling

technologies have afforded unprecedented availability by offering constant access from anywhere at any time of day (Gainsbury & Wood, 2011; Olason et al., 2011). The increasing proliferation of gambling opportunities in a variety of mediums may heighten the risk for disordered gambling, as availability, accessibility and acceptability of gambling are known precursors to higher prevalence rates (Blaszczynski & Nower, 2002).

The last decade has marked unparalleled expansion in gambling opportunities, particularly the increasing availability of electronic gaming machines (EGMs), which have been called the "crack cocaine" of gambling (Dowling, Smith, & Thomas, 2005) because of the addictive potential of their interval ratio reinforcement schedule of conditioning (Blaszczynski, Sharpe, Walker, Shannon, & Coughlan, 2005; Dixon, Harrigan, Sandhu, Collins, & Fugelsang, 2010; Harrigan & Dixon, 2010). Recent inquiries into the addictive nature of EGMs have focused on machine features and promotion of responsible play (Monaghan & Blaszczynski, 2010; Monaghan, Blaszczynski, & Nower, 2009b; Sharpe, Walker, Coughlan, Enersen, & Blaszczynski, 2005; Stewart & Wohl, 2013), but the discrete psychological processes underlying chasing behavior during EGM play is less understood.

Classification and Prevalence

A majority of people who gamble, do so for entertainment. But a small proportion of individuals develop problems so severe it impairs their lives and the lives of their families. Gambling disorder was first recognized as a psychiatric condition in DSM-III (American Psychiatric Association, 1980) under the term "pathological gambling," and classified along with trichotillomania, kleptomania and other disorders that interfere with impulse management (DSM-IV: APA, 1994; DSM-IV-TR: APA, 2000). The recent publication of DSM-5 (APA, 2013; Moran, 2013) has brought a few modifications to nosology, re-labeling "pathological gambling" as "gambling disorder" and relocating the criteria within a new category, "Addiction and Related Disorders." In addition, the diagnostic cutoff has been reduced from the prior requisite of five of ten criteria to the newly required four of nine criteria (DSM-5: APA, 2013; Moran, 2013; Potenza, 2013); omitting the commission of illegal acts as an indicator. For purposes of clarity and consistency, problem and pathological gambling that meets clinical criteria will be referred to as "gambling disorder" throughout this dissertation (with the exception of when referring to literature that uses prior classification systems such as the Canadian Problem Gambling Index: Ferris & Wynne, 2001). In addition, this work will also refer to *disordered gambling* to as a "behavioral addiction."

It is estimated that roughly 1 to 2% of adults meet criteria for gambling disorder, and roughly twice as many adults have some form of gambling-related difficulty, often referred to as "problem gambling," "sub-threshold gambling," or "at-risk gambling" (Shaffer et al., 1999; Shaffer & Hall, 2001; Volberg, 1994; Welte et al., 2001). Youths and college-aged individuals have both demonstrated heightened vulnerability when compared with adults (Shaffer et al., 1999; Shaffer & Hall, 2001; Welte et al., 2001; Welte, Barnes, Tidwell, & Hoffman, 2008), with estimates of gambling disorder ranging from 3 to 7% (Derevensky, Gupta, & Winters, 2003; Hardoon & Derevensky, 2002; Shaffer & Hall, 2001).

Among those who meet diagnostic criteria for gambling disorder, a certain percentage will "recover" without formal treatment, so the associated symptoms appear to be somewhat transitory in nature (Hodgins & El-Guebaly, 2000; LaPlante, Nelson, LaBrie, & Shaffer, 2008; Slustke, 2006), though those who do recover typically have less severe forms of gambling-related pathology (Toneatto et al., 2008), with as few as 6% of gamblers with some degree of gambling-related pathology (not necessarily gambling disorder) ever seeking treatment for their gambling difficulties (Suurvali, Hodgins, Toneatto, & Cunningham, 2008). However, significant confusion exists regarding the definition of what constitutes "recovery" (i.e., the absence of past-year symptoms, abstinence or control) and how that definition is operationalized in research studies (Nower & Blaszczynski, 2008). In addition, it is generally agreed that disordered gambling is a spectrum disorder, with individuals moving toward and away from more progressive forms of pathology over time (LaPlante et al., 2008; Slutske, 2006; Williams & Hann, 2012) rather than a categorical disorder, in which individuals remain in discrete categories such as recreational or disordered with little opportunity for change (LaPlante et al., 2008). However, what motivates gamblers to increase or reduce their behavior at any particular point in time remains largely unknown (Shaffer & Martin, 2011).

Disordered gamblers experience a multitude of negative consequences, including debt, legal problems, and bankruptcy (Ladouceur, Boisvert, Pepin, & Loranger, 1994; Nichols, Stitt, & Giacopassi, 2000), increased risk of criminal behavior and offenses (Meyer & Stadler, 1999; Potenza et al., 2000), heightened risk of suicide (Ledgerwood & Petry, 2004; Petry & Kiluk, 2002), impairments in health (Potenza, Fiellin, Heninger, Rounsaville, & Mazure, 2002), decreased work productivity (Nower, 2003), as well as an increased vulnerability to substance and affective disorders (Petry, 2001b; Petry, Stinson, & Grant, 2005). The families of disordered gamblers also suffer negative consequences (Darbyshire, Oster, & Carrig, 2001; Hodgins, Shead, & Makarchuk, 2007; Lesieur & Rothschild, 1989), including an increased likelihood that children of disordered gamblers will go on to develop gambling problems or comorbid addictive behaviors (Jacobs et al., 1989; Nower, Derevensky, & Gupta, 2004).

Demographic Factors

Men and women gamble differently, reporting dissimilar motivations (Stewart & Zack, 2008), game preferences (Odlaug, Marsh, Won Kim, & Grant, 2011), rates of disordered play (Welte et al. 2001), and timeline of impairment (Tavares et al., 2003). In contrast to men, women who gamble problematically are more likely to report coping ("I gamble to relax") and social motives ("I gamble as a way to celebrate"), and men and women report similar enhancement motives ("I gamble because I like the feeling") (Stewart & Zack, 2008). In terms of game preference, women tend to prefer nonstrategic games (e.g., slot machines) while men prefer games of strategy, e.g., sports betting, cards. In one study assessing game preferences among pathological gamblers, Odlaug and colleagues (2011) found that 71.5% of the non-strategic (i.e. machine) gamblers were women, while nearly 70% of strategic (i.e. skill) gamblers were men (Odlaug et al. 2011).

There are also significant gender differences regarding the development and severity of disordered gambling symptoms. Welte and colleagues (2001) found that, compared to women, men reported inflated rates of current (2.1% vs. 1.8%) and lifetime (5.2% vs. 2.9%) pathological gambling, as well as higher rates of current problem/pathological (6.4% vs. 4.7%) and lifetime problem/pathological gambling (14.3% vs. 8.9%). Differences were also noted for frequency of gambling; with nearly twice as many men (13.4%) as women (7.3%) reporting gambling on average two or

more times per week in the past year (Welte et al. 2001). Studies have also identified a "telescoping effect" for women; as compared to men, women begin gambling later in life and have a shorter span from onset of gambling to onset of pathology (Nower & Blaszczynski, 2006; Taveres et al., 2003). Tavares and colleagues (2003) also found a telescoping effect for women versus men: women began gambling later in life (36 versus 23 years).

Ethnicity may also play a role in differences among disordered gamblers. A number of studies have found that that ethnic minorities report higher rates of pathology compared to Caucasians (Shaffer, Hall, & Vander Bilt, 1997; Welte, et al., 2001), with African-Americans (Gerstein et al., 1999; Nower & Blaszcyznski, 2008) and Native Americans (Volberg & Abbott, 1997) demonstrating particular vulnerability. Among a representative sample of 2,638 U.S. adults, Welte and colleagues (2001) examined prevalence rates by ethnic background. Their findings demonstrated that roughly 1 of every 200 (0.5%) white respondents met classification for pathological gambling, and approximately 1 in 50 (1.8%) white respondents reported problem or pathological gambling. By comparison, more than one of every 20 Native Americans (5.3%) were classified as pathological gamblers, and nearly one of every nine Native American (10.5%) were classified as problem or pathological gamblers. Hispanic and African American participants also had significantly higher rates than whites, with 4.2% of Hispanic and 3.7% of African American respondents meeting criteria for pathological gambling, and 7.9% and 7.7%, respectively, meeting criteria for problem or pathological gambling (Welte et al., 2001). These ethnic differences may be due, in part, to differences in gambling vulnerability related to socio-economic status (Shaffer et al., 1999; NRC,

1999), wherein the presence of chronic financial hardships or unmet economic needs have been shown to motivate individuals to take economic risks via gambling (Blalock, Just, & Simon, 2007; Callan, Shead; & Olson, 2011; Mishra & Fiddick, 2012).

The Phenomenon of Chasing

"Chasing" is a clinical criterion specific to gambling disorder that refers to returning to the gambling venue another day in an attempt to win more money while winning or win back losses while losing (DSM-5: APA, 2013; Lesieur, 1979). In early stages of disorder, gamblers may chase when winning, although, as the disorder progresses, they subsequently turn to chasing as a strategy to recoup losses during the losing and desperation stages (Custer, 1984). Some studies have also identified chasing behavior as a symptom that discriminates gambling pathology (Orford, Sproston, & Erens, 2003; Toce-Gerstein, Gerstein, & Volberg, 2003). For example, Toce-Gerstein and colleagues (2003) evaluated each diagnostic symptom among a community sample of 399 adults in the United States who endorsed at least one DSM-IV criteria for gambling disorder. Chasing to recoup losses was the most commonly reported diagnostic criteria, with nearly three of every five respondents (59.6%) reporting chasing behavior. Among disordered gamblers, 84.1% reported chasing to offset losses, compared to roughly half (50.7%) of low-risk gamblers. The authors highlighted that chasing may be particularly helpful in discerning asymptomatic gamblers from individuals with any level of gambling pathology (Toce-Gerstein et al., 2003). However, it is possible that the frequency of 'chasing' may have been overestimated in studies using the DSM-IV screen, which asks only whether a respondent 'has ever chased,' and does not assess the frequency of chasing. Orford (2003) also noted that the term "chasing," when used generally in an

assessment, may have less predictive value than measuring, for example, chasing within a session of gambling, chasing wins, or chasing to escape debts unrelated to gambling losses (Orford, 2003). A study in Australia operationalized chasing according to three domains: cognitive (behavioral intentions to chase), emotional (urges to chase), and behavioral (actually chasing) among male off-course bettors (n = 84) (i.e., horse race betting that takes place outside the race track) and female electronic gambling machine players (n = 73) (O'Connor & Dickerson, 2003). Their results indicated that off-course bettors were more likely to chase than electronic gaming machine (EGM) players. In addition, chasing was more common among those with higher levels of impaired control and higher gambling-related debt (60% of EGM chasers had gambling-related debt compared to only 26% of EGM non-chasers with gambling-related debt). Despite differences in perceptions of skills between off-course bettors (belief in skill) and EGM players (no belief in skill), there were no differences in chasing behavior between the groups. There were also no significant gender differences in terms of chasing, though male participants were more likely to feel urges to increase bet sizes following losses as well as to actually increase their bet sizes following losses (O'Connor & Dickerson, 2003).

Similar to O'Connor and Dickerson's (2003) finding on impaired control and chasing, Breen & Zuckerman (1999) identified higher levels of impulsivity as a predictor of chasing behavior among a sample of male university students all of whom had a lifetime history of gambling (N = 248) (Breen & Zuckerman, 1999). Chasing behavior has also been associated with increased activation in brain regions associated with expectation of rewards, while non-chasing has been found to correlate with increased activation in brain regions associated with anxiety and conflict monitoring among a sample of adults in the United Kingdom (N = 23) (Campbell-Meiklejohn, Woolrich, Passingham, & Rogers, 2008). The degree of desire to gamble immediately before gambling was also found to be positively related to the number of spins played in the face of loss during a slot machine session among a sample of Ontario university students ((Young, Wohl, Matheson, Baumann, & Anisman, 2008). These findings, taken together, suggest a strong brain-behavior connection between the strength of the desire to gamble (motivation, arousal) and subsequent chasing while gambling. Further exploring the factors that are positively correlated with chasing, particularly under loss conditions, could provide valuable information for responsible gambling and informed choice efforts to minimize the harm from problem gambling.

Game Type

Disordered and problematic gambling have shown stronger associations with specific types of gambling including electronic gaming machines (Dowling et al., 2005; Petry, 2003; LaPlante, Nelson, LaBrie, & Shaffer, 2011), casino games (Welte, Barnes, Wieczorek, Tidwell, & Parker, 2002; Welte, Barnes, Tidwell, & Hoffman, 2009), and Internet gambling (Griffiths, Wardle, Orford, Sproston, & Erens, 2009; Olason et al., 2011; Welte et al., 2009). LaPlante and colleagues (2011) assessed past year gambling involvement by game type among participants living in the United Kingdom (N = 9,003), using interviews drawn from 10,144 randomly selected addresses in Scotland, Wales, and England collected in the 2007 British Gambling Prevalence Survey (BGPS: National Centre for Social Research, 2007). The authors found that individuals who played virtual gaming machines had the highest prevalence rate (26.9%) of any game type reporting one or more DSM-IV symptoms and the second highest prevalence rate at 11.3% (behind only spread-betting) for a diagnosis of problem gambling (3+ DSM-IV symptoms). In addition, past-year gaming machine play was associated with a higher number of game types played in the past year, i.e., machine players averaged slightly more than seven game types compared to an average 2-3 game types in the past year for the overall sample of gamblers. The authors then controlled for the number of different game types played in the past year, which then eliminated the associations between game type and disordered gambling status for all game types with the exception of gaming machines. Prior to adding in the number of game types as a control variable, gaming machine players were roughly 24 times more likely to have an increase in disordered gambling status, and even after control, they were still more than four times more likely to have an increase in disordered gambling status (LaPlante et al., 2011). Among a sample of Icelandic youth and adolescents (N = 1,537), Olason and colleagues (2011) found Internet gamblers were seven times more likely to be problem gamblers (7.7%) compared to non-Internet gamblers (1.1% problem gambling). In addition, the authors note that the rates of Internet gambling have shifted upward when comparing data against a similar sample of Icelandic youth from 2003 and 2004 (Olason et al., 2011; Olason, Sigurdardottir, & Smari, 2006; Olason, Skarphedinsson, Jonsdottir, Mikaelsson, & Gretarsson, 2006). In addition to the associations of higher rates of disorder by gambling type, studies have also found that disordered gamblers are also more likely than those without disorder to engage in several forms of gambling (LaPlante et al., 2011; Nower & Blaszcyznski, 2006; Turner, Zangeneh, & Littman-Sharp, 2006; Welte et al., 2009).

The Effect of Prior Losses/Wins

Research on prior outcomes and chasing behavior has primarily investigated the behavior as a strategy to recoup losses (Breen & Zuckerman, 1999; O'Conner & Dickerson, 2003), while reports of early and big wins have been found to precede future disordered gambling (Sharpe, 2002). Foundational research on horse race betting demonstrated that bettors wagered their largest bets at the end of the day as a strategy to recoup losses experienced beforehand (Ali, 1977; McGlothlin, 1956). In addition, participants who received unanticipated "windfall gains" have shown an increased propensity to continue gambling (Arkes et al., 1994). In a study of Ontario gamblers (N = 105) Turner and colleagues (2006) found that problem gamblers reported experiencing an average "big win" of \$620 as compared to \$139 for the non-problem gambler; a big win early in the gamblers career was a key characteristic differentiating the problem gambler from the non-problem gamblers.

The experience of losses and "losses disguised as wins," i.e., spins on a slot machine where the amount wagered is more than the amount won, have been found to produce more physiological arousal than regular losses (Dixon et al., 2010). In another study, players who experienced "near wins," i.e., losses where two of the three symbols on the pay line were identical, gambled for significantly more spins and lost more money than players who experienced losses without any near-wins (Cote, Caron, Aubert, Desrochers, & Ladouceur, 2003). Kreussel and colleagues (2013) assessed for behavioral differences and brain behavior using event-related brain potential (ERP) in response to regular losses and near-losses on a modified blackjack game. The study compared findings between problem/disordered gamblers and controls. When presented with nearlosses, both groups were less likely to hit on a '16,' though brain behavior differences were noted between the control and problem group. Specifically, the control group's ERPs demonstrated a less pleasant response to the near-losses compared to regular losses, while the problem/disordered gamblers failed to differentiate between the two types of losses. The findings underscore the possibility that individuals with gambling problems may have diminished sensitivity to specific types of loss compared to non-problem gamblers (Kreussel et al., 2013).

Wins may also maintain problems with gambling-related cognitions, leading gamblers to misperceive the nature of random outcomes. Monaghan and colleagues (2009a) assessed the relationship between wins and losses and gambling-related cognitions among a sample of Australian undergraduate psychology students (N = 45). The students who experienced 'losses' during an electronic gaming machine session had significant reductions in their gambling-related cognitions from pre to post-play. However, there was no significant change in gambling-related cognitions following play for those who won money during their gambling session (Monaghan, Blaszczynski, & Nower, 2009a). Young and colleagues (2008) assessed wins and losses as well as the magnitude of wins on gambling desires and cravings in two experiments with Ontario university students. They found that gamblers who experienced prior wins reported heightened desires and cravings to continue gambling among moderate-risk and problem gamblers as compared to non-problem gamblers. In addition, participants who experienced a series of small wins subsequently played more spins in the face of loss compared to those who experienced one single big win (Young et al., 2008).

Responsible Gambling

Differences in betting patterns and nature of play across levels of problem gambling severity suggest that internally imposed limit-setting can assist individuals in gambling responsibly. The field of responsible gambling has developed rapidly in recent years as a strategy to reduce harm associated with the widespread expansion of gambling availability (Blasczcynski et al., 2011; Ladouceur, Blaszczynski, & Lalande, 2012; Peller, LaPlante, & Shaffer, 2008). The term "responsible gambling" is a catchall of sorts, referring to harm reduction strategies to encourage informed choice and limit-setting in gambling.

Many jurisdictions have introduced responsible gambling initiatives and programs (Blaszczynski et. al, 2011; Jonson, Lindorff, & McGuire, 2012), and some jurisdictions are considering making limit-setting a mandatory component of electronic gaming machines (Ladouceur et al., 2012). Such programs typically include: limit-setting, modifying electronic gaming machine features (e.g., slowing the reel spin), use of warning messages delivered to the gambler with information regarding gambling risks (e.g., "Quit while you're ahead") or pop-up messages as a player approaches their limits ("you are now halfway to your limit"), and smart cards that track data and feature responsible gambling tools (e.g., money-limit, summary statements).

Limit-Setting & Limit-Adherence

In general, studies have shown that the more you gamble, the more money you lose (LaBrie, Kaplan, LaPlante, Nelson, & Shaffer 2008; Weinstock, Ledgerwood, & Petry, 2007). As a result, responsible gambling programs have attempted to reduce financial harms associated with excessive play by encouraging players to set monetary and/or time limits for gambling. These limits should prove helpful to players, provided that most players set reasonable limits and adhere to them. However, empirical studies on limit-setting have yielded mixed and inconclusive results (Ladouceur et al., 2012; Nower & Blaszczynski, 2010). In one study, problem gamblers indicated that they were unaware of how much they were spending during play and would be unlikely to set limits unless required to do so (Nower & Blaszczynski, 2010). In their investigation of limitsetting, Wohl and colleagues (2008) identified three distinct subgroups of gamblers: 1) those who do not set limits and continue to play until out of money; 2) those who do not set explicit limits but still monitor their wins and losses while playing within safe parameters; and 3) those who do set and adhere to limits (Wohl et al., 2008). A few different studies have also found that a majority of players, fail to set monetary limits prior to play and even fewer set time limits for their play (Bernhard, Lucas, & Dongsuk, 2006; Ladouceur et al., 2012; Omnifacts Bristol Research, 2007). In a review of 17 studies assessing limit-setting, Ladouceur and colleagues (2012) found that only 30% of players set monetary limits and almost all players refrained from setting time limits for play (Ladouceur et al., 2012). Similarly, Bernhard and colleagues (2006) studied use of a mandatory "smart card" (a prepaid gambling card) with optional money limiting features in an analogue casino laboratory in Nevada. Utilizing data from more than 12,000 individual card transactions, the study found that only 3% of transactions used the money-limiting features and just over 1% of transactions used the time-limit tool (Bernhard et al., 2006). In a study of slot machine players, Nower & Blaszcyznksi (2010) found that among a sample of 127 Australian casino players recruited on-site at four different venues, problem gamblers were less likely than other gamblers to endorse
any type of monetary limit-setting prior to play; in addition, they were reticent to adopt the use of a smart card or other strategy to limit access to money during a session, despite admitting they lost track of money while gambling and were rarely aware of whether they were winning or losing. Among Swedish Internet gamblers (N = 2,348), limit-setting was the most preferred social responsibility gambling tool (i.e., from a responsible gambling program called *PlayScan*) offered to players, although nearly half of players surveyed reported they didn't use the tool (Griffiths, Wood, & Parke, 2009). Findings from a majority of studies suggest that optional limit-setting features may be of limited utility in reducing excessive spending, particularly among problem gamblers most in need of limits. However, a few studies have found some support for limit-setting (see for e.g., Lalande & Ladouceur, 2011), particularly when strategies are tied to cognitively based interventions rather than merely to limit-setting (Stewart & Wohl, 2013; Wohl, Christie, Matheson, & Anisman, 2010).

Machine Features, Warning Messages, & Smart Cards

In addition to monetary limit-setting, researchers and policymakers have considered other strategies to reduce the harm caused by excessive gambling: 1) machine feature modifications, 2) warning and pop-up messages, and 3) and smart cards that track gambling behavior and can be programmed with responsible gambling features (e.g., money-limits, pop-up reminder messages).

Electronic gaming machines have been designed with decision making and riskseeking behavior in mind (Dowling et al., 2005). As a result, responsible gambling researchers have tried to counteract vulnerability by modifying machine features and parameters that promote harm. Loba and colleagues (2001) found that the sights and sounds of video lottery terminals produced the most reactivity when compared with other machine feature modifications, i.e., a counter which showed a player's running total, changing the "reel spin controls" (Loba, Stewart, Klein, & Blackburn, 2001). An Australian research team assessed machine feature modifications among players (N = 210) visiting a club or venue with the intent to play EGMs. The authors found that reducing the maximum bet size resulted in players gambling for shorter amounts of time, making fewer wagers, experiencing decreased financial losses, and lowering the usage rates of alcohol and tobacco (Sharpe et al., 2005). These findings varied by level of gambling severity, with disordered gamblers preferring machines that accepted larger bills and allowed for higher maximum bets (Sharpe et. al, 2005). Offering players the ability to stop the machine during play has also led to increases in the illusion of control, associated with an increase in the number of games played per session by participants in Quebec (Ladouceur & Sevigny, 2005).

Researchers have also investigated the utility of warning and pop-up messages in promoting more responsible play. Such messages, frequently cued by tracking behavioral information such as smart cards, pop up on the gaming machine screen as players approaches their limit (e.g., "You are now at 75% of your limit."), in response to recent wins (e.g., "Quit while you're ahead."), or as random information designed to modify gambling-related cognitions, e.g., "The result of a spin has nothing to do with any previous spin" (Floyd, Whelan, & Meyers, 2006; Schottler Consulting, 2010). Messages can be used in response to any behavioral pattern that has shown a predictive relationship with gambling pathology, e.g., the number of machines a gambler plays on in a session of play (Haefeli, Lischer, & Schwarz, 2011). Similar to limit-setting research, the findings regarding warning and pop-up messages have shown mixed results. One study reported that pop-up messages that challenged common erroneous cognitions about gambling outcomes reduced gambling-related cognitions among participants and decreased overall expenditures when compared to players without the warning messages (Cloutier, Ladouceur, & Sevigny, 2006; Floyd et al., 2006). However, other studies have reported negative results, finding that warning messages failed to influence gambling behavior (Steenbergh et al., 2004) or modify gambling-related cognitions (Monaghan et al., 2009a). Conflicting results may be due, in part, to the mode of message delivery. For example, one study found that pop-up message information was recalled more frequently than static messages (Monaghan & Blaszczynski, 2010). However, there is little evidence that even recalled messages effectively alter gambling-related cognitions or influence gambling behavior. Inconsistency in terms of mode of delivery, message content, and other parameters regarding message administration (e.g., how and when do messages arrive to player) further complicate the findings. However, there is some preliminary data to suggest that the use of simple targeted messages to underscore changes or accelerations in betting patterns may hold some promise for overall harm reduction efforts, though significantly more systematic research is needed to identify the most salient uses of messages and the most influential content and mode of delivery.

Smart cards have been heralded in some jurisdictions, particularly Australia and Canada, as a tool to limit excessive spending during play. However, there are few peerreviewed studies that systematically evaluate the efficacy of smart cards and the studies that exist are typically conducted by consulting groups associated with vendors of the technology. Similar to a pre-paid phone card, a "smart card" is a credit device that players use to pre-commit the amount of money they will spend for a specified period of time at a venue. A study in Nova Scotia employed smart cards that delivered messages to regular gamblers about exceeding their limits. Though over 80% of the 121 participants who used the cards reported it assisted them in adhering to limits, less than half of those surveyed reported actually using the cards regularly, and most indicated they would only use a smart card if it were mandatory (Omnifacts Bristol Research, 2005). In another study in a laboratory setting, players were required to insert their smart card, but then had the option of whether or not to use any and all of the responsible gambling features on the card during play on a video lottery terminal. Only half (51%) of bets placed used one responsible gamble feature, most often requesting a summary of expenditures, but only 3.0% of the sample used the money-limit feature and 1.3%, used the time-limit features (Bernhard et al., 2006). Similarly, in Australia, an evaluation of a commercial system that provided for money and time limits as well as warning and reminder messages found that about 33% of participants surveyed reported the card was of no benefit to them, though 36% reported that the money-limit feature was useful (N = 91) (Schottler Consulting, 2010). Another study by the same consulting group reported that 52% of players (N = 52) found the responsible gambling features helpful, though a majority of those who endorsed the feature were non-problem gamblers (Schottler Consulting, 2009).

These findings suggest that it is difficult to assess the efficacy of responsible gambling initiatives such as limit-setting, machine feature modification, warning messages, and smart cards if they are voluntary, because most gamblers fail to use them or minimize their effectiveness. In addition, research conducted with these technologies has been limited by small sample sizes of disordered gamblers and a lack of systematic, peer reviewed research. The few empirical studies that have been conducted suggest that disordered gamblers failed to set loss limits (Nower & Blaszczynski, 2010), set higher maximum loss limits than other players (Lalande & Ladouceur, 2011), and in general failed to adhere to limits they set (Lalande & Ladouceur, 2011; Nower & Blaszczynski, 2010). One study, conducted at slot machine venues in Queensland, Australia, found that disordered gamblers were less likely than recreational gamblers to set money-limits for play, more likely to let the situation dictate how much they spent, and more likely to bet more as a means of chasing losses (Nower & Blaszczynski, 2010). In addition, nonproblem gamblers were more likely to set and adhere to limits compared to moderate-risk and disordered gamblers. One possible explanation for this difference may be that, for disordered gamblers, money functions like a drug rather than a tool to purchase necessities (Nower & Blaszczynski, 2010). Therefore, disordered gamblers could be motivated to gamble as long as possible to chase "action" or excitement or to escape from dysphoric mood states; they would be more likely, then, than their non-disordered counterparts to resist measures that would limit their time in action or escape.

Unintended Consequences of Responsible Gambling Practices

Responsible gambling practices are grounded in the notion of reducing harm among players, though there have been instances where the tools have increased risk of harm and given rise to ethical concerns (Bernhard et al., 2006; Jonson et al., 2012; Omnifacts Bristoal Research, 2005; Schottler Consulting, 2009, 2010). In their review of limit-setting, Ladouceur and colleagues (2012) reported that players are just as likely to increase as to restrict their gambling expenditures after setting a limit (Ladouceur et al., 2012). An Australian study investigating *SimPlay*, i.e., a responsible gambling program integrated into existing loyalty cards, found that more players (53%) increased their gambling expenditure than did those (42%) who decreased spending when loyalty cards were enhanced to include limit-setting features (N = 52) (Schottler Consulting, 2009). Similarly in an Australian study assessing the *PlaySmart* responsible gambling tool (N =91), nearly two-thirds (62%) of players reported setting a higher money-limit than usual when playing with a smart card. This effect was strongest among moderate-risk gamblers, with nearly four out of five (78%) moderate-risk gamblers setting higher money-limits when using a smart card (Schottler Consulting, 2010).

An additional, noteworthy concern about smart cards is their potential to increase gambling-related erroneous cognitions. Bernhard and colleagues (2006) reported that disordered gamblers who received a summary statement of their gambling expenditures were concerned that seeing summary statements might unwittingly trigger chasing via beliefs that a machine was 'hot' or 'cold' and possibly fuel gambling-related cognitions (Bernhard et al., 2006).

These findings could imply that it is the process of decision making under conditions of risk, rather than the activities themselves, that determine subsequent behavior during play. If that is true, then the same individuals may report different responses to harm reduction initiatives, depending on subjective assessments of gambling situations. For some, limit-setting or warning messages may precipitate a "cool-down" period of reflection that limits subsequent gambling. However, for others, a precommitment requirement may result in setting higher initial spending limits, increasing bet size, and/or increasing the speed of play.

In summary, jurisdictions have adopted various responsible gambling strategies, aimed at reducing the potential harm of excessive gambling behavior following widespread expansion of gambling opportunities. A majority of these strategies are designed to alert gamblers to the time or money expended and/or to provide mechanisms for limiting access to money in the heat of play. Research into the efficacy of these strategies has yielded mixed findings, though a majority of studies suggest that gamblers - particularly those with higher levels of problem gambling severity - are reticent to adopt harm reduction strategies that would impair their ability to play freely during a session. Some studies have found that gamblers gamble more rather than less money in response to imposed restrictions. This suggests that future development of successful responsible gambling strategies will depend in large part on understanding the mechanisms that underlie decision making while gambling and designing interventions targeting those mechanisms. Developing effective harm reduction strategies, then, will depend on first understanding the underlying decision making mechanisms across gambling activities and levels of problem gambling severity. The current investigation will explore some of these underlying, subjective facets of decision making to identify potentially important determinants with implications for harm reduction.

Theoretical Framework: Decision Making & Goal Setting

The field of judgment and decision making (JDM) has investigated a wide range of behavioral phenomena regarding how individuals make decision, i.e., calculate risk, across different contexts. The majority of JDM investigations have been conducted using Prospect Theory as a theoretical framework (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). Prospect Theory is a behavioral economic paradigm that suggests that people value gains and losses differently and will, therefore, base decisions on their desire to reach or exceed the reference point (be in the domain of gains) as well as their desire to avoid being in the domain of losses. Prospect Theory has been used primarily to identify discrete psychological processes that drive decision making, such as loss aversion (Tversky & Kahneman, 1991); risk aversion (Kimball, 1993; Holt & Laury, 2002); hot-cold empathy gaps and affective arousal (Loewenstein, 1996, 2005; Ariely & Loewenstein, 2006); uncertainty and ambiguity aversion (Tversky & Fox, 1995; Fox & Tversky, 1995); the role of framing effects (Levin, Schneider, & Gaeth, 1998); the possibility effect (Kahneman & Tversky, 1979; Tversky & Fox, 1995); the peanuts effect (Tversky & Kahneman, 1992; Weber & Chapman, 2005); and goals as reference points (Heath, Larrick, & Wu, 1999).

The latter process, goal setting, is particularly relevant to field of disordered gambling because it suggests that the goals people set for themselves while gambling may play a critical role in subsequent chasing during play, even in the face of mounting losses. Goal setting is guided by the three core principles of Prospect Theory: 1) *the reference point*, 2) *loss aversion*, and 3) *diminishing sensitivity* (Kahneman & Tversky, 1979; Tversky & Kanheman, 1991). The first principle, *the reference point*, describes how the choices people decide between occur with respect to their expectation. A reference point can be something personal to the individual, i.e., a goal (Heath et al., 1999), a "status quo" expectation that is based on prior experiences (Kahneman, Knetsch, & Thaler, 1991), or an expectation that has been influenced by exposure to important others in one's life (Callan, et al., 2011; Loewenstein, Thompson, & Bazerman, 1989). For purposes of this dissertation, I will be investigating goals as reference points. The

concept of the reference point suggests that, when an individual set a goal, all possible outcomes they experience occur relative to that goal; outcomes that result in the achievement of that goal are deemed as gains or successes, and outcomes that fall short are deemed as losses or failures. The distinction between gains and losses gives rise to the second theoretical principle, *loss aversion*. The principle of loss aversion states that decision-makers are typically twice as sensitive to losses as to similar-sized wins. As a result, individuals tend to make seemingly irrational decision due to their increased aversion regarding the prospect of future losses or the experience of recent losses. The third principle, *diminishing sensitivity*, suggests that outcomes have less relative impact, as outcomes gets further away from the goal or reference point. For example, a loss that takes someone from \$110 to \$120 below their goal is less painful than a loss that takes the same person from \$10 to \$20 below their goal. Taken together, these principles provide a theoretical explanation for the role of chasing behavior in gambling, where disordered gamblers continue to chase losses to their financial detriment. While losing, a gambler may work hard to meet their goal (reference point), chase to win back losses so as avoid the experience of losing money (*loss aversion*), and be less sensitive to falling into worsened financial circumstances since they are already well below their goal, decreasing the relative impact of each additional loss (*diminishing sensitivity*).

In a gambling situation, it is likely that the goal (objective and/or subjective) sets the expectation (*reference point*). Therefore, participants will be particularly mindful of that goal in situations where they lose, because they dislike the feeling of finishing below the reference point (*loss aversion*); this displeasure over staying in a losing game will not only facilitate their desire to get even but will also cause participants to become less sensitive to each subsequent loss since their relative distance from their goal will change less and less with each loss (*diminishing sensitivity*). In sum, setting higher goals sets a challenging reference to achieve, thereby increasing the likelihood of both loss aversion and diminishing sensitivity to facilitate chasing behavior.

The study of goal setting and the goal choices offered to participants has typically been manipulated in the experimental setting (for a review of objective goal setting, see Locke & Latham, 1991). However, some projects have identified the impact of subjective goal setting, i.e., goals that are based on an individual's personal expectations and are independent of the influence of the experimental team (Heath et al., 1999). The investigation of goals has occurred in a wide variety of fields (see Austin & Vancouver, 1996, for a review) including: decision making (Heath et al., 1999; Larrick, Heath, & Wu, 2009), personality psychology (Elliott & Thrash, 2002; Pervin, 1989), motivation (Elliott & Church, 1997; Locke & Latham, 1990, 1991, 2002), and achievement (LaPorte & Nath, 1976; Elliott, 1999). However, the study of both objective and subjective goals has frequently been conducted without a focus on how these processes could function in domains where higher goals could facilitate maladaptive behavior patterns (e.g., chasing behavior in the gambling environment). The simultaneous study of both objective and subjective goals in the gambling environment has yet to be conducted, and therefore literature on the subject is severely lacking. Literature that identifies how the processes of subjective and objective goal setting are associated with chasing behavior is also absent. Gaining a better understanding of the mechanisms that drive chasing would provide valuable insight into a real-world behavior that differentiates problem gambling severity status levels (Orford, 2003; Petry, 2003; Toce-Gerstein et al., 2003).

Goal setting theoretical frameworks and empirical reviews of goals have shown relationships between higher goals and increased effort, increased persistence, and decreased performance satisfaction (Heath et al., 1999; Latham & Locke, 2002; Locke & Latham, 1990). Studies have also found that higher goals increase levels of risk-taking (Larrick et al., 2009). Larrick and colleagues (2009) assessed the relationship of an objective goal setting script on risk-taking behavior in a negotiation task among student participants (N = 152) who were randomized to set either a *specific and challenging* goal or a do your best goal. In the task, one participant was asked to propose a split of a shared pot of money (\$7) with themselves and another responder who could either accept or reject the offer. In the event the responder agreed to the proposed split, both participants received the money, however, if the responder rejected the proposal, neither participant received the money. Therefore, asking for more than half of the split is deemed risky. Participants in the specific and challenging goal condition were told to ask for a specific and challenging goal. As a result, participants in experimental condition asked for more than half of the money 29% of the time compared to only 5% in the do your best goal condition. In addition, fewer proposals were agreed upon in the specific and challenging condition, i.e., only 53% of the specific and challenging goals resulted in successful negotiations compared to 68% of proposals accepted in the do your best goal condition. In this respect, setting higher goals led to increased risk-taking (Larrick et al., 2009). Specific and challenging goals have shown a strong relationship with performance (Locke & Latham, 2002). A review of 201 studies comparing specific and challenging goals against do your best goals found that 91% of the studies showed better performance for those in the specific and challenging condition. It should be noted that in Locke and

Latham's review, performance was assessed in non-negotiation tasks, e.g., set a goal to do more push-ups, set a goal to memorize a very challenging number of words (Locke & Latham, 1990). Larrick and colleagues (2009) negotiation task highlights how risk-taking in certain contexts can lead to detrimental results for individuals.

Subjective or personal goals have also shown a positive relationship with performance, persistence, and effort (Stoeber, Uphill, & Hotham, 2009; Wolters, 2004). With regards to performance, Stoeber and colleagues (2009) assessed the role of achievement goals among a sample of triathletes (N = 126) for the participant's upcoming race. Higher ratings on the importance of achieving performance-approach goals ("It is important for me to perform better than others") were associated with better race performance, while reporting higher performance-avoidance goals ("I just want to avoid performing worse than others") were associated with worse race performances (Stoeber et al., 2009). Wolters (2004) assessed the relationship between subjective goals and motivational engagement, which included measures of persistence and effort, among junior high students (N = 525). The findings from a 3-step hierarchical regression analysis showed that setting higher mastery goals ("I want to learn as much as possible") were related to increased persistence and effort, while setting higher performanceavoidance goals ("I don't want to do worse than other students") were associated with lower levels of persistence. Performance-approach goals did not significantly predict either persistence or effort, though this may have been driven by psychometrics. The mastery subscale was comprised of six items, performance-avoidance five items, and performance-approach was comprised of only two items. These results are in line with predictions that higher degrees of approaching a goal (and not fear of failure) are

associated with increased effort and persistence, while avoiding a negative outcome, i.e., fearing failure as a goal, result in diminished persistence.

Of note, a majority of goal setting research has focused on the relationship of goal setting on outcomes where increased effort and persistence increase task performance, or in fields (e.g., scholastic achievements, athletic performance) where effort and persistence sensibly increase performance. The gambling environment carries with it a long-term financial disadvantage to gamblers (see LaBrie et al., 2008), which represents a detour from adaptive domains, insofar as the house advantage is and remains (e.g., slot machines on average pay out 80-90 cents on the dollar). This disadvantage will remain, no matter how hard (effort) or how long (persistence) the gambler continues to try to beat the house. In the process of continued play, the amount of the gambler's financial disadvantage will continue to grow with increased effort and persistence resulting in more financial losses.

Additionally, some individuals may not consciously set high goals but, once engaged in play, their behavior may respond accordingly due to specifically designed risk features of the gambling environment. In sum, individuals who set high goals for their gambling play (*subjective goals*) or are exposed to a goal that is specific and challenging (*objective goals*) should be more likely to chase, especially under conditions of loss, where each additional spin below their goal (i.e., reference point) should impact them less (i.e., diminishing sensitivity) than those who have not set high goals for their play.

Other Positive Outcome Motivations for Play

Gambling goals are motivated by the prospect of a positive outcome and may share commonalities with other similar motivations for other positive outcomes associated with play. However, to date, research has yet to explicitly study goals in connection with gambling, so the current research must be informed by limited comparisons with motivations for other positive outcomes associated with disordered gambling, such as enhancing positive emotion, gambling for rewards, and gambling as a strategy to win money. In this respect, gambling goals may function as an additional egosyntonic motivation that predicts disordered patterns of play (see El-Guebaly, Mudry, Zohar, Tavares, & Potenza, 2012). Other ego-syntonic motivations have shown associations with disordered gambling; gambling to enhance one's mood has shown positive relationships with both frequency of gambling and gambling pathology among a community-recruited sample (N = 193) of gamblers from Ontario and Nova Scotia, the majority of which (n = 154, 79.8%) were problem or pathological gamblers (Stewart & Zack, 2008), as well as among sports bettors recruited onsite at a Canadian pub (N = 61)(Lister, Wohl, & Davis, 2013). Nower and colleagues (2004) found that high levels of intensity seeking resulted in increased chances of disordered gambling for females but not for males in a sample of 1,339 junior college-aged youths (Nower et al, 2004). Lee and colleagues (2007) investigated five different gambling motivations for their relationship to gambling severity among 240 students from a Korean university, including four different positive outcomes (e.g., gambling for socialization, amusement, excitement, and to win money). Their findings highlighted gambling as a means of winning money as the most predictive motivation towards increased levels of gambling severity (Lee et al., 2007), while other studies underscored the relationships between gambling and excitement/entertainment (Nower & Blaszczynski, 2010). Disordered gamblers have also been show to play as a means of earning income more often than

recreational players (Nower & Blaszczynski, 2010). Feeling 'real' or authentic during gambling has also shown a positive relationship with higher levels of both biggest betting wins and biggest betting losses among sports bettors in Ontario (Lister et al., 2013). Neighbors and colleagues (2002) assessed gambling motives among a sample of 184 university students. The four most common motivations for gambling were all positive outcome motivations for play, and represented 84.2% of the sample. The most commonly cited motivations for play were: monetary gain (42.7%), enjoyment/fun (23.0%), social reasons (11.2%), and excitement (7.3%). The leading negative reinforcement motivation was playing to offset boredom or occupy time (2.8%). Of note, not a single student indicated playing to cope or escape as their primary motivation for play. No significant relationships were observed between the above gambling motives and levels of problem gambling severity (Neighbors et al., 2002).

Gambling as a means of reward-seeking has also been investigated for its role in disordered gambling (Callan et al., 2011; Petry, 2001a; Potenza, 2008; Reuter et al., 2005; Sztainert, Wohl, McManus, & Stead, 2013). Projects have explored the inability to delay rewards (Callan et al., 2011; Petry, 2001a), the level of reward sensitivity among gamblers (Sztainert et al., 2013), and brain behavior differences in reward processing systems as factors that may predispose individuals to problematic forms of gambling (Potenza, 2008; Reuter et al., 2005). Specifically, studies have found that disordered gamblers and others who gamble to excess are less likely to delay rewards than non-gamblers (Callan et al., 2011; Petry, 2001a). A Canadian research team found that the more sensitive a disordered gambler was to rewards, the less motivated they were to seek treatment for gambling problems (N = 92) (Sztainert et al., 2013). Reward sensitivity has

also been investigated using imaging techniques (e.g., fMRI) for brain behavior differences between gamblers and non-gamblers, with projects finding that disordered gamblers show reduced activation of the reward processing systems, thereby providing an explanation for why disordered gamblers seek more rewards through their behavior, i.e., they feel rewards less than non-gamblers (Potenza, 2008; Reuter et al., 2005). This type of study, however, is limited by the costly nature and thus small sample size, e.g., Reuter and colleagues assessed brain behavior differences among 12 pathological gamblers and 12 controls (Reuter et al., 2005).

Behavioral Approach and Inhibition and Gambling Behavior

Motivational perspectives on gambling may also provide a foundation to explain differences in goal setting, reward seeking, and motivation for gambling. Gray (1981) described two primary modes of motivation: behavioral approach and behavioral inhibition. Behavioral approach has also been referred to as appetitive motivation (Gray, 1981), behavioral activation (Fowles, 1987), promotion (Crowe & Higgins, 1997), or sensitivity to reward (Torrubia, Avila, Molto, & Caseras, 2001). Behavioral inhibition has also been referred to as aversive motivation (Gray, 1981), prevention (Crowe & Higgins, 1997), sensitivity to punishment (Torrubia et al., 2001), or fear of failure (Herman, 1987, 1990). Behavioral approach entails a motivation of approaching pleasurable circumstances or goals, while behavioral inhibition describes motivational phenomena drive by aversion to pain or unpleasant circumstances (Crowe & Higgins, 1997; Gray, 1981). Approach motivation has shown stronger associations with positive psychological states such as psychological well-being and self-esteem (Coats, Janoff-Bulman, & Alpert, 1996), though reward focus in the gambling has been studied as a vulnerability factor (Petry, 2001a; Potenza, 2008; Sztainert et al., 2013).

The investigation of behavioral approach has looked at three different dimensions. Reward responsiveness looks at how much an individual responds when rewarding experiences happen to them ("When good things happen to me, it affects me strongly"), fun-seeking looks at how much an individual craves activities that are enjoyable ("I am always willing to try something new if I think it will be fun"), and drive measures how willing an individual is to go after something they desire ("I go out of my way to get things I want"). The behavioral approach subscales have shown mixed results with gambling behavior. High levels of trait-based reward responsiveness demonstrated a positive relationship with chasing losses among 23 adults participants in the United Kingdom (Campbell-Meiklejohn et al., 2012); however, in a different project with a sample (N = 448) comprised largely of females (n = 352, 78.6%), both males and females demonstrated that a higher degree of reward responsiveness was associated with a lower level of problem gambling severity (Atkinson, Sharp, Schmitz, & Yaroslavsky, 2012). Fun-seeking reports have demonstrated a fairly consistent relationship with gambling behavior, i.e., the degree of fun-seeking has shown a negative association with money spent gambling (N = 533 college students; females: n = 361, 67.7%) (O'Connor, Stewart, & Watt, 2009); in addition, fun-seeking reports have shown, as well as a negative relationship among males (females were non-significant) between fun-seeking with the level of problem gambling severity (Atkinson et al., 2012). Higher scores for drive have shown a positive relationship with money spent gambling and gambling frequency (O'Connor et al., 2009), though Atkinson and colleagues (2012) did not find a significant relationship between drive and gambling severity for either males or females (Atkinson et al., 2012). Reports on the association between behavioral inhibition ("I worry about making mistakes") and gambling behavior have been less frequent. O'Connor and colleagues (2009) demonstrated a negative association between behavioral inhibition and classification of being a gambler (versus non-gambler) among the aforementioned sample of over 500 university students (O'Connor et al., 2009).

Summary

Gambling availability has seen widespread expansion in recent years. In response, jurisdictions have turned to responsible gambling programs as a means of offsetting the progression from recreational to disordered gambling. However, the efficacy of these programs has produced mixed and inconclusive results. In addition, the existing literature highlights that a majority of disordered gamblers may be reticent to adopt responsible gambling strategies. This may in part be due to the heretofore emphasis of risk-averse language in limit-setting, warning messages, and player card features. This dissertation will assess a reward-focused motivational construct, goal setting in both: the frequency of which gamblers set goals for play, and whether or not those goals are associated with a key diagnostic criteria, chasing behavior, identified as a risk factor for gambling-related harm. This dissertation will also investigate the relationship of goal setting and chasing while participants gambling under loss/win conditions while controlling for key demographic and dispositional factors that may influence the relationship between goal setting, loss/win conditions, and chasing behavior. In sum, this dissertation will fill in gaps for the role of goal setting and loss/win conditions on chasing behavior among players, while providing detailed information about which subgroups of players may be most susceptible to setting goals and chasing behavior, and whether or not the presence of goal setting and loss/win conditions increase those subgroups' risk of chasing behavior.

Chapter 3: Method

This chapter presents the methodology of the study of goal setting, loss/win condition, and chasing behavior. Areas of the chapter include research questions and hypotheses, study design (e.g., sampling strategy, ethics process) and study protocol (e.g., data collection and study procedures), measurement reliability and validity of major study variables, and methods of analysis.

Research Questions

Research Question #1: Whether subjective (self-report) versus objective (experimentally manipulated) gambling goals result in higher levels and/or degrees of chasing behavior?

Subjective Goal Hypotheses for Research Question #1:

- 1.1 Participants with higher degrees of subjective gambling goals will chase more frequently than participants with lower degrees of subjective gambling goals.
- 1.2 Participants with higher degrees of subjective gambling goals will chase for more spins than participants with lower degrees of subjective gambling goals.

Note. Subgroup tests included: gender, objective goal setting condition, loss/win condition, problem gambling severity status, problem gambling severity total score, reward responsiveness, drive, fun-seeking, behavioral inhibition, ethnicity.

Note. Separate analyses conducted by gender

Objective Goal Hypotheses for Research Question #1:

- 1.3 Participants in the specific and challenging condition will chase more frequently than participants in the do your best condition.
- 1.4 Participants in the specific and challenging condition will chase for more spins than participants in the do your best condition.

Note. Subgroup tests included: gender, subjective goals, loss/win condition, problem gambling severity status, problem gambling severity total score, reward responsiveness, drive, fun-seeking, behavioral inhibition, ethnicity

Note. Separate analyses conducted by gender.

Research Question #2: Whether an experience of prior losses results in higher levels of chasing behavior than an experience of prior wins?

Hypotheses for Research Question #2:

2.1 Participants in the loss condition will chase more frequently than participants in the win condition.

2.2 Participants in the loss condition will chase for more spins than participants in the win condition.

Note. Subgroup tests included: gender, subjective goals, objective goal setting condition, problem gambling severity status, problem gambling severity total score, reward responsiveness, drive, fun-seeking, behavioral inhibition, ethnicity.

Note. Separate analyses conducted by gender.

Research Question #3a: Whether the significant variables identified in preliminary analyses prove predictive in multiple logistic regressions for the overall sample, and by separate analyses conducted by gender?

Note. Subgroup tests included: gender (excluded in gender-specific analyses), subjective goal setting, objective goal setting condition, loss/win condition, problem gambling severity total score, reward responsiveness, drive, fun-seeking, behavioral inhibition, and all the significant interactions between the major study variables.

Note. Separate multiple logistic regressions conducted for overall sample (N = 121), males (n = 67), and female participants (n = 53).

Hypotheses for Research Question #3a:

3.1 Among the overall sample, gender, problem gambling severity, and subjective goals will be most predictive of chasing decision.

3.2 Among the male subsample, problem gambling severity, subjective goals, drive, and reward responsiveness will be most predictive of chasing decision.

3.3 Among the female subsample, problem gambling severity status, subjective goals, and behavioral inhibition will be most predictive of chasing decision.

Research Question #3b: Whether the significant variables identified in preliminary analyses prove predictive in multiple linear regressions for the overall sample, and by separate analyses conducted by gender?

Hypotheses for Research Question #3b:

3.4 Among the overall sample, gender, problem gambling severity, and subjective goals will be most predictive of chasing spins.

3.5 Among the male subsample, problem gambling severity, subjective goals, drive, and reward responsiveness will be most predictive of chasing spins.

3.6 Among the female subsample, problem gambling severity status, subjective goals, and behavioral inhibition will be most predictive of chasing spins.

Design and Procedures

Sampling Strategy

Participants in this project were all Carleton University undergraduate psychology students. To be eligible for the study, participants needed to: a) have gambled at least once in their lifetime, and b) not previously participated in studies associated with the Carleton University Gambling Lab (the latter inclusion criteria was necessary since previous participants would have been informed of the deception, i.e., pre-programmed outcomes on the slot machines during debriefing). The sampling strategy targeted recreational gambling for purposes of inclusion; with a representative percentage of the sample indicating some level of gambling-related pathology via self-report on the Canadian Problem Gambling Severity Index (CPGI: Ferris & Wynne, 2001). Almost all of the participants in the study were college-aged, primarily first-year psychology students. This cohort (which typically extends to age twenty-one) has demonstrated significant vulnerability towards problem gambling in previous projects. The legal age for casino gambling in Canada is 19 years, so some percentage of the participants had not experienced play on a slot machine prior to taking part in this study. (Note: The team did not assess slot machine gambling play prior to this study, so the exact percentage is unknown.)

Ethics Process

Ethics permissions were submitted at the beginning of the Fall 2011 semester. Subsequent study requests and modifications were completed and submitted to the Carleton Ethics Board, with enrollment commencing October 27^{th,} 2011. Data collection was completed by August of 2012.

Recruitment

Participants were recruited through Carleton University's Psychology Experiment Sign-Up System, also known as the SONA System (see Appendix A). The recruitment portal targeted first and second-year psychology students and featured numerous studies available to students. Remuneration through SONA provides compensation in the form of course credit or financial payment. For the purposes of our study, participants were provided \$20 as payment and instructed that they would use that money to gamble in the virtual casino. They were also instructed that any money won or lost and beyond that would be theirs to keep. The experimenter posted study timeslots a few days in advance of the study; participants generally signed up a few days in advance of their enrollment. The SONA System provided automated email reminders to both the experimenter and participants, which helped minimize the frequency of participant no-shows. Potential participants were allowed one no-show before being declared ineligible for the project. Telling participants of their upcoming remuneration days in advance of their attendance was conducted purposely to help mitigate behavioral biases that occur when gambling with house money (for a review of the endowment effect see Kahneman, Knetsch, & Thaler, 1990; Thaler & Johnson, 1990).

Ethics permission was also obtained to recruit participants in common university settings ("active recruitment") as well as through Carleton's mass testing recruitment stream, which includes roughly 4000 incoming freshmen students. The study team made the decision to use the SONA System alone due to its relative recruitment efficiency, and in the process reducing the associated selection biases that can occur when employing multiple recruitment strategies.

Consent

All participants read an informed consent (see Appendix B) before agreeing to participate in the study. The consent reviewed information about study procedure and remuneration and was presented to participants in electronic format. Some aspects of the study were explained in deceptive language. The Carleton University Ethics Board approved study deception prior to enrollment commencement. No identifying information was obtained in the consent (i.e., participants consented by clicking 'yes' and did not have to write their signature on the document).

Data Collection

All surveys were completed using Survey Monkey, a web-based survey administration software program. The data were kept electronically under password protection. Upon completion of data collection, the survey data were exported from Survey Monkey into an Excel file, which was then cleaned and organized manually before entering into SPSS. Behavioral data were tracked during the study by the experimenter in a data-tracking book, and then transferred from the data-tracking book to an Excel spreadsheet, which was then transferred into the aforementioned SPSS data file. The experimenter also tracked other study information and data during the study. This included: participant initials (for purposes of ensuring data were transferred without error), the code of the experiment being conducted (i.e., loss or win condition), (specific and challenging, do your best goal setting condition), participant ID, experimenter initials, decision to chase (yes/no), chasing spins (0-92), and any pertinent comments about participant behavior and reliability of their data (e.g., participant failed to follow instructions). Participant names were initially listed on the SONA System, but were removed following the completion of the semester in which the student participated in the project. From then on, participant initials and participant ID were used to identify cases. Participants in this experiment were coded with the letters GS (i.e., goal setting) in front of a chronologically relative numeric code, e.g., the first participant in the study was GS 01, the last participant was GS 136.

Study Protocol

Participants came to the Visualization and Simulation Building (VSIM) at Carleton University for study participation, and were then greeted by the experimenter conducting the experiment. Before enrollment, participants read through an electronic consent form and then asked if they had any questions. The experimenter then answered any participant questions and reminded the participant of the study parameters and timeline. After consent was provided, participants followed a strict experimental protocol (Appendices L & M). This protocol was outlined, practiced, and finalized between the two experimenters conducting the study sessions. For purposes of strengthening internal validity and minimizing experimenter bias (Campbell & Stanley, 1966), it was imperative that participants had as near to identical experiences as possible, independent of experimenter, day of the week, or any other unidentified factor. Participants study time averaged 45 minutes, though they were instructed to set aside an hour of time (this allowed for slower participants to avoid being rushed). Participants initially filled out a battery of pre-measures (i.e., see Appendices F, G, & H).

After completing their pre-surveys, the experimenter showed the participant the relevant objective goal-setting script (i.e., "specific and challenging" or "do you best", see Appendices P & Q). The "specific and challenging" script told participants:

Thank you for playing with us.

We thought we would tell you how people are doing so far at the Rideau River Casino! ***Last 15 Gamblers*** Credits: 89.6 (up 9.6 credits) Money: \$22.40 (up \$2.40) We hope you enjoy similar success!

This script was intended to set participant expectations higher than the status quo (i.e., 80 credits). In this respect, the manipulation was meant to shift their reference point to 89.6 credits. Those in the "do your best" condition read a matching script in terms of color, word count, and also references to the Rideau River Casino. However, in this condition, participants were just encouraged to "do your best" without any specific or challenging information regarding gambling goals. See below for "do your best" script: Thank you for playing with us.

We thought we would remind you how much you have to gamble with at the Rideau River Casino! ***Gambler Info*** Credits: 80 Money: \$20

We hope you do your best!

Following the objective goal setting script, participants filled out a one-item assessment of the participant's monetary expectations for the upcoming session. This item read, "What is your goal for today's gambling session?" and had responses anchored at 1 (*not lose any money*) to 7 (*win a lot of money*). These response items were written to cover the full range across high levels of loss aversion to high levels of reward seeking.

Once participants completed the gambling expectations item, the experimenter asked them to move to a different computer, which was where slot machine play took place. The slot machine play was part of a virtual reality experience created by Psychology Software Tools for Dr. Wohl's lab (see Baumann et al., 2003; the software had been employed in numerous projects at the Carleton University Gambling Lab, the author and research team designed a project that could be tested within the parameters of the VR program, piloted members of the lab, and then began enrolling participants). Once the experimenter loaded up the software program for the virtual reality casino, participants were asked to put on the virtual reality goggles. Thereafter, their participation was in an immersive virtual reality casino environment.

In this immersive experience, participants used the keyboard to control their movements, starting off outside the casino and then walking into the Rideau River Casino. Once in the virtual casino participants were allowed five minutes to walk around the casino environment which included blackjack tables, video poker, sports betting room, a bar, ATMs, a cash window to redeem winnings, casino patrons, and other aesthetics typically associated with the casino setting. This extra five minutes also allowed participants to acclimatize to the environment and minimize the experience of temporary dizziness upon wearing the goggles. Participants then selected a machine they wished to play on and were instructed on how to play the slot machines; these instructions included: telling participants they would play for five minutes, converting their \$20 dollars into 80 credits (money was virtually entered into the slot machine by the participant), instructing to only play 1 credit per spin, showing the possible winning combinations and payouts (see Appendix Q for Payout Table), and explaining the slot machine pay line and credit meters.

Participants began their gambling session following their instructions briefing. At this point, the experimenter started an egg timer and sat on the opposite partition from the participant. From there the experimenter could see the participant's play, though this information was kept private from the participant to minimize the Hawthorne Effect (e.g., behaving different when being watched, see Bracht & Glass, 1968). The experimenter then tracked the number of spins (which were scripted in one of two manners depending on loss/win condition, see Appendix P for casino scripts). The experimenter also kept note of any deviations from instructions made by the participants, e.g., some participants played max bets in spite of instructions not to bet more than one credit per spin (see Appendix L for Enumerated Data Tracking Form).

As the participant approached their 30th spin the experimenter readied the egg timer, sounding the alarm as the 30th spin finalized. The experimenter then walked around the partition and confirmed with the participant they had completed their five minutes of gambling (30 spins). At this point, the experimenter stated to the participant:

OK, that was your time. We now offer you one of two opportunities; you can continue gambling or you can cash out (experimenter alternated order of options). If you choose to continue gambling, the same rules as before will apply, i.e., whatever money you have left will be yours to keep. Also, if you choose to continue, you may gamble for as many spins as you like and are free to stop at any point. Would you like to continue gambling or do you wish to cash out now?

In the instance the participant decided to continue play (chasing decision), the experimenter returned to the other side of the partition and subsequently tracked the number of spins played (chasing spins). All spins after the prompt were losses outlined in a persistence script (see Appendix P for all the casino scripts).

Once participants decided to discontinue play, they were then instructed to move back to the survey computer and complete the post-measures (i.e., Appendices I & J for the Goal Setting/Goal Satisfaction Scales, and demographics form). For those who decided not to continue play after 30 spins, they were immediately instructed to begin the post-measures. Regardless of decision to continue play, all participants completed a brief cognitive task (unrelated to this study) following the post-measures.

An additional open-ended assessment was conducted prior to debriefing to assess whether participants had guessed study hypotheses (i.e., to minimize demand characteristics). This form contained four questions, which started broadly and funneled to more specific questions about detecting deception (See Appendix I for Deception Funnel). Participants very rarely reported any specific notion of what the study hypotheses entailed. Upon completion, participants read a debriefing form, which outlined the elements of deception and rationale for using the procedures, and also included a few recommended readings in the event participants wanted to know more about the project (see Appendix C).

In the instance a participant indicated an urge to gamble again, the study team had at their disposal a perseverance phenomenon script, which explained these feelings to participants (see Appendix M). The experimenter also had referral information for treatment if a participant indicated that their gambling urges could or already had become problematic even after reading the perseverance phenomenon script. The experimenter was instructed to walk participants to the university health services in this instance. Fortunately, this occurrence did not present for any of the participants. All participants were remunerated \$25 for their time, this amount was \$2 more than what those in the win condition could possibly earn, therefore all participants were paid equally. Following payment, participants were asked to provide permission for use of their data, i.e., their original consent involved deception so participants needed to re-submit permission once fully informed of study aims (see Appendix D). Permission for use of data was provided in all cases.

	Variables	Measurement	Data Source
Pre-measurement Variables	Degree (continuous) of Problem Gambling Severity	CPGI-9 (PGSI) total score	Self-report
	Level (ordinal) of Problem Gambling Severity Status	CPGI-9 (PGSI): non-problem gambler, low-risk gambler, moderate- risk gambler, problem gambler	Self-report
	Degree (continuous) of Gambling Expectations	Monetary expectations for slot machine play	Self-report
	Level (categorical) of Objective Goal Setting Condition	Specific and challenging (experimental), do your best (control)	Experimenter assigned (random)
	Degree (continuous) of Reward Responsiveness	Behavioral Approach Scale – Reward Responsiveness Subscale	Self-report
	Degree (continuous) of Drive	Behavioral Approach Scale – Drive Subscale	Self-report
	Degree (continuous) of Fun-Seeking	Behavioral Approach Scale – Fun-Seeking Subscale	Self-report
	Degree (continuous) of Behavioral Inhibition	Behavioral Inhibition Scale	Self-report
	Level (categorical) of Loss/Win Condition	Losses, Wins	Experimenter assigned

Table 1 Study measurement variables

Gambling Behavior Variables	Chasing Decision (categorical)	Decision to continue play following prompt	Behavioral
	Chasing Spins (Ln) (continuous)	Spins played following prompt (Ln transformation)	Behavioral
Post-measurement Variables	Degree of Subjective Goal Setting (continuous)	Subjective goal setting scale	Self-report
	Gender (categorical)	Male, female, prefer not to say	Self-report
	Ethnicity (categorical)	Caucasian and European Origin, Other Ethnic Origin	Self-report

Predictor Variable	Dependent Variable
Gender Ethnicity	Decision to Chase (yes/no) Chasing Spins (Ln)
Problem Gambling Severity (total score) Problem Gambling Severity Status Reward Responsiveness (BAS) Drive (BAS) Fun-Seeking (BAS) Behavioral Inhibition	
Subjective Goal Setting Objective Goal Setting Gambling Expectations Item Loss/Win Condition	

 Table 2 Predictor and dependent variable table

Note. Chasing spins was non-normally distributed with skewness of 2.69 (SE = 0.22) and kurtosis of 10.10 (SE = 0.44). Therefore, Chasing Spins (was transformed using a natural Log transformation into Chasing Spins (Ln).

Note. Gender was dummy-coded with males = 0 and females = 1. Decision to chase was dummy-coded with No = 0 and Yes = 1, and was measured in response to both wins and losses. Objective goal setting condition was dummy-coded with do your best = 0 and specific and challenging = 1. Loss/win condition was dummy-coded with loss = 0 and win = 1. Ethnicity was dummy-coded into Caucasian/European Origin = 0 and Other Ethnic Origin = 1 due to small sample sizes among all minority groups. Level of Problem Gambling Severity Status was coded using the Canadian Problem Gambling Index classification system (Ferris & Wynne, 2001) in the following manner: non-problem gamblers (PGSI = 0); low-risk gamblers (PGSI = 1 – 2); moderate-risk gamblers (PGSI = 3 - 7); problem gamblers (PGSI = 8 - 27). Chasing spins (Ln) was measured in continuous form in response to both wins and losses. All other variables were measured in continuous form.

Measurement Reliability & Validity

Subjective Goal Setting Scale

The Subjective Goal Setting Scale was developed using the questionnaire (Elliott & Church, 1997), which has demonstrated psychometric validity (see Elliott & Church, 2002) with three discrete subscales: performance approach ($\alpha = .91$), performance avoidance ($\alpha = .77$), and mastery ($\alpha = .89$). The Achievement Goals Questionnaire was developed using approach/avoidance motivation as a theoretical backdrop (Crowe & Higgins, 1997). For the purposes of this project the research team wrote items using the performance approach and performance avoidance subscales of the Achievement Goals Questionnaire as a theoretical backdrop. Both of the scales assess the salience of achievement via performance of academic goals, but were written about gambling goals. The mastery subscale contained items about achieving internal mastery over a subject matter, which the research team did not were relevant to gambling behavior. The Behavioral Approach and Behavioral Inhibition scales and subscales (BIS/BAS: Carver, 1994), the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ; Torrubia et al., 2001), the Fear of Failure Questionnaire (Herman, 1987, 1990) and the Achievement Motivation subscale of the Personality Research Form (PRF: Jackson, 1974) all informed the subjective goal setting scale.

The subjective goal setting scale was comprised of nine items (see Appendix F) including, "It was very important to me to win more money than other participants," I wanted to win money in this gambling task so others could see my gambling ability," I worried about the possibility of losing money during this gambling task (unused)," The

thought of ending the task with less money than other participants motivated me to do everything I could to win," Once I started losing my money on the task, I tried even harder to win my money back, "As I began to lose more and more money on the task, I started to feel like giving up (unused)," I would have felt like playing for longer had I been experiencing more wins," I enjoy gambling activities that involve risk so long as I have a chance to win," and, "I would rather win a lot of money quickly than earn a similar amount over a longer period of time (unused)." All responses were anchored at 1 (*strongly disagree*) to 8 (*strongly agree*). Reliability analyses were conducted, resulting in a six-item version of the scale. The scale demonstrated adequate psychometric reliability ($\alpha = .75$).

Objective Goal Setting Condition

The majority of goal setting projects have randomized participants to an experimental (*specific and challenging*) or control (*do your best*) condition. Specifically, as outlined by Locke and Latham (1991), participants have been randomly assigned to one of two goal-setting conditions. The study team followed this protocol and developed a script for both the experimental and control conditions. The "specific and challenging" condition script informed participants that the average participant was able to turn their \$20 of seed money into \$22.40 (i.e., roughly up 10 credits by session's end). Those in the comparison condition were told simply to do their best. The scripts were matched in terms of word count, design and colors of the script, and time required to read the material.
Gambling Expectations Item

A single item assessment of participants' monetary expectations for their slot machine gambling session was given immediately prior to play. The item asked, "What is your goal for today's gambling session?" This item was anchored at 1 (*not lose any money*) and 7 (*win a lot of money*), with a goal of "breaking even" placed at 4. In this respect, the scale was intended to capture the range across high levels of loss aversion to high levels of reward seeking.

Loss/Win Condition

The loss and win condition casino scripts were given to roughly half of the participants. Random assignment was not employed, i.e., the loss condition data were collected initially due to scheduling concerns using a student population with limited availabilities. In both circumstances, participants started with \$20 (80 credits) and had the same instructions regarding their play (i.e., you will play for 30 spins, you can only bet 1 credit per spin). In addition the sequence of their wins and losses was kept similar, i.e., they experienced a similar number of wins and losses; the difference in experience was in the magnitude of the wins and losses. The study team piloted two versions of the loss condition, codified as "steep" and "normative" loss. In the steep loss script, participants lost \$3 or 12 credits during the first 30 spins, finishing with 68 credits, while in the normative loss script they only dropped \$1.25 or 5 credits from their starting point, finishing with 75 credits. The "steep" loss script was employed due to concerns that the "normative" loss condition wasn't a salient enough loss condition. Thereafter the "steep" loss script constituted the loss condition. Given the parameters of the VR software, making the loss condition any "steeper" was not realistic given the agreed upon

parameters of participants playing 1 credit per spin for 30 spins. Keeping participants at 1 credit per spin allowed for less extraneous differences, though allowing participants to make larger bets (2-3 credits per spin) would have allowed for steeper losses. However, in the event the team allowed for larger bet sizes in the loss condition, the win condition would have needed to be matched for the same allowance, thus promoting a higher magnitude of wins. The study team was concerned that doing this would possibly encourage irrational beliefs about gambling success and skill. The last remaining option would have been to minimize the number of spins and just have participants an experience of a single large loss or large win. However, the team wanted to provide an slot machine experience with credible external validity that would afford for the study of associated decision-making processes (i.e., the team didn't feel isolated bets on slot machines was representative of typical slot machine behavior).

Behavioral Approach and Behavioral Inhibition Scales

The Behavioral Approach and Behavioral Inhibition scales assess two types of motivation: behavioral approach and behavioral inhibition (Appendix H: Carver, 1994). The scale consists of 24 items (four of which are fillers), and has demonstrated psychometric reliability (Carver, 1994). There are three subscales that assess behavioral approach: drive ($\alpha = .76$), reward responsiveness ($\alpha = .73$), and fun-seeking ($\alpha = .66$), and one scale for behavioral inhibition ($\alpha = .74$). All items are anchored at 1 (*very false for me*) and 4 (*very true for me*). Of note, the original scale calls for a reverse ordering of these items; the author contacted the scale developer and asked if he had any concerns for switching the scale direction (this allowed items to stay in same direction as all other survey measures). The scale developer indicated this would not create any psychometric

problems. Within this sample, the following psychometric reliabilities were demonstrated: behavioral inhibition ($\alpha = .76$), drive ($\alpha = .70$), reward responsiveness ($\alpha = .65$), and fun-seeking ($\alpha = .66$).

Gender

All participants were asked their gender on a demographic form (see Appendix G) with response choices of male, female, or prefer not to say. Male gender was codified as the reference.

Problem Gambling Severity

The Problem Gambling Severity Index is a nine-item measure of gambling severity that was developed as one scale of the Canadian Problem Gambling Index (CPGI: Ferris & Wynne, 2001). The scale has demonstrated psychometric reliability (α = .84) in previous projects (Ferris & Wynne, 2001), though within this sample the reliability analysis was less robust (α = .65). All items were anchored at 0 (*never*) to 3 (*almost always*) with a possible score ranging from 0 to 27. The scale was measured in both continuous form (PGSI = 0 – 27) and as an ordinal variable using the problem gambling severity status classification scheme, i.e., non-problem gamblers (PGSI = 0), low-risk gamblers (PGSI = 1 to 2), moderate risk gamblers (PGSI = 3 to 7), and problem gamblers (PGSI = 8 to 27).

Ethnicity

Ethnic background was measured with a one-item assessment regarding participant's ethnicity (see Appendix G). Participants could indicate the following: 1) Caucasian/European origin, 2) Asian (Chinese, Japanese, or Korean), 3) South Asian (East Indian, Pakistani, Punjabi, or Sri Lankan), 4) South East Asian (Cambodian, Indonesian, or Laotian), 5) Black (African, Haitian, Jamaican, or Somali), 6) Hispanic and South American origin, 7) Middle Eastern, 8) Native Canadian/American, or 9) Other or Multi-Ethnic Origin. Ethnicity was dummy coded as a dichotomous variable with Caucasian and European Origin = 0 and Other Ethnic Origin = 1 for all analyses due to the small sample sizes within each minority status group.

Chasing

Chasing behavior was measured in two forms. Chasing decision was dummy coded as a categorical variable (no = 0, yes = 1) and assessed whether participants continue to play after their first 30 spins. Chasing decision was the dependent variable of interest in the multiple logistic regression analyses. Chasing spins was a continuous variable that was explored in preliminary analyses. Chasing spins was transformed using a natural Ln transformation and explored during preliminary analyses. The continuous measure of chasing assessed the transformed degree of chasing. All spins following the prompt were losses (see Appendix P for Persistence Script), with near-wins incorporated on roughly 30% of the spins. The scripting of all losses for persistence has been used in prior studies (Cote et al., 2003; Sztainert, Wohl, & Abizad, 2013). All participants, regardless of loss/win or objective goal setting condition experienced the same script of losses once they chose to continue gambling, with one minor caveat, i.e., those in the loss condition started with 68 credits, while those in the win condition started with 92 credits. The first 68 persistence spins were scripted in an identical manner for all participants, and the remaining 24 persistence spins were scripted in the same manner as the preceding 68

spins (i.e., all losses, near-wins 30% of the spins). Of note, only one participant in the win condition spun beyond the first 68 spins.

Interaction Terms

Interaction terms were generated after conducting preliminary analyses. Centering procedures were used (to control for multi-collinearity), i.e., all significant predictors were centered (mean subtraction) and then interaction terms were generated for all significant interactions using the newly centered versions of each variable.

Methods of Analysis

The researcher used univariate, bivariate, and multiple forward logistic regression techniques to analyze the study data. Participant survey data were collected through a web-based portal (Survey Monkey) that only advanced participants following completion of their current page, resulting in minimal cases of missing data. Behavioral data were organized and enumerated by the research team into a study-tracking book that was kept in a locked drawer throughout the study. Participants who did not follow instructions or failed to understand the slot machine parameters were excluded from analyses (i.e., resulting in 15 unusable cases of behavioral data).

Univariate analyses were conducted to generate frequency and range for categorical variables, while measures of central tendency (i.e., means, modes) and statistical variability (e.g., standard deviation) were quantified for continuous variables.

Bivariate analyses were conducted to explore the relationship between the primary independent and dependent study variables. Chi-square and one-way ANOVAs were conducted to explore group differences and predictors of chasing decision (dummycoded); one-way ANOVAS and correlations were conducted to explore group differences and predictors of chasing spins and chasing spins (Ln transformed).

Multiple forward logistic regression analyses were conducted to explore unique interactions between the predictor variables and the primary dependent variable, decision to chase.

<u>Analysis for Hypothesis 1.1:</u> Participants with high levels of subjective gambling goals will chase more frequently than participants with low levels of subjective gambling goals.

The investigator explored this hypothesis using regression. This analysis, run on the total sample (N=121), assessed the relationship of the level of chasing (dummy-coded) associated with the degree of subjective gambling goals. Chi-square analyses were conducted to look for group differences in chasing by gender, objective goal setting condition, loss/win condition, and ethnicity; a one-way ANOVA with Bonferroni corrections was conducted to look for group differences in chasing by problem gambling severity status. Additional correlations were conducted to investigate for interactions with subjective goals, problem gambling severity, reward responsiveness, drive, fun-seeking, and behavioral inhibition. All of these analyses were conducted on the overall sample, and all of the above analyses (with the exception of group differences by gender) were also conducted for the male (n = 67) and female (n = 53) subsamples.

Analysis for Hypothesis 1.2: Participants with high levels of subjective gambling goals will chase for more spins than participants with low levels of subjective gambling goals.

The investigator explored this hypothesis using correlation. This analysis, run on the total sample (N=121), assessed the relationship of the degree of chasing spins associated with the degree of subjective gambling goals. One-way ANOVAs were conducted to look for group differences in chasing spins by gender, objective goal setting condition, loss/win condition, and ethnicity, and problem gambling severity status (using Bonferroni correction procedures). Additional correlations were conducted between

problem gambling severity, reward responsiveness, drive, fun-seeking, and behavioral inhibition with chasing spins. All of these analyses were conducted on the overall sample, and all of the above analyses (with the exception of group differences by gender) were also conducted for the male (n = 67) and female (n = 53) subsamples.

Analysis for Hypothesis 1.3: Participants in the specific and challenging condition will chase more frequently than participants in the do your best condition.

The investigator explored this hypothesis using a chi-square analysis. This analysis, run on the total sample (N = 121), assessed the relationship of the level of chasing associated with the level of objective goal setting condition. Chi-square analyses were conducted to look for group differences in chasing decision by gender, loss/win condition, and ethnicity; a one-way ANOVA was conducted to explore for group differences by problem gambling severity status (using Bonferroni correction procedures). Additional one-way ANOVAs were conducted to investigate for group differences in objective goal setting condition with subjective goals, problem gambling severity, reward responsiveness, drive, fun-seeking, and behavioral inhibition. All of these analyses were conducted on the overall sample, and all of the above analyses (with the exception of group differences by gender) were also conducted for the male (n = 67) and female (n = 53) subsamples.

Analysis for Hypothesis 1.4: Participants in the specific and challenging condition will chase for more spins than participants in the do your best condition.

The investigator explored this hypothesis using one-way ANOVA. This analysis, run on the total sample (N=121), assessed for group differences in objective goal setting condition with the degree of chasing spins. One-way ANOVAs were conducted to look

for group differences in chasing spins by gender, loss/win condition, and ethnicity, and problem gambling severity status (using Bonferroni correction procedures). Additional correlations were conducted between problem gambling severity, reward responsiveness, drive, fun-seeking, and behavioral inhibition with chasing spins. All of these analyses were conducted on the overall sample, and all of the above analyses (with the exception of group differences by gender) were also conducted for the male (n = 67) and female (n = 53) subsamples.

Analysis for Hypothesis 2.1: Participants in the loss condition will chase more frequently than participants in the win condition.

The investigator explored this hypothesis using a chi-square analysis. This analysis, run on the total sample (N = 121), assessed the relationship of the level of chasing associated with the level of loss/win condition. Chi-square analyses were conducted to look for group differences in chasing decision by gender, objective goal setting condition, and ethnicity; a one-way ANOVA was conducted to explore for group differences by problem gambling severity status (using Bonferroni correction procedures). Additional one-way ANOVAs were conducted to investigate for group differences in loss/win condition with subjective goals, problem gambling severity, reward responsiveness, drive, fun-seeking, and behavioral inhibition. All of these analyses were conducted on the overall sample, and all of the above analyses (with the exception of group differences by gender) were also conducted for the male (n = 67) and female (n = 53) subsamples.

Analysis for Hypothesis 2.2: Participants in the loss condition will chase for more spins than participants in the win condition.

The investigator explored this hypothesis using correlation. This analysis, run on the total sample (N=121), assessed the relationship of the degree of chasing spins associated with the level of loss/win condition (dummy-coded). One-way ANOVAs were conducted to look for group differences in chasing spins by gender, objective goal setting condition, ethnicity, and problem gambling severity status (using Bonferroni correction procedures). Additional correlations were conducted between problem gambling severity, reward responsiveness, drive, fun-seeking, and behavioral inhibition with chasing spins. All of these analyses were conducted on the overall sample, and all of the above analyses (with the exception of group differences by gender) were also conducted for the male (n = 67) and female (n = 53) subsamples.

<u>Analysis for Hypothesis 3.1:</u> Among the overall sample, gender, problem gambling severity, and subjective goals will be most predictive of chasing decision among the major study variables.

The investigator explored this hypothesis using multiple forward logistic regression techniques. This analysis, run on the total sample (N = 121), assessed the unique prediction of major study variables in Blocks 1 and 2 that proved significant (p < .05) during preliminary analyses on chasing decision. Interaction terms that proved significant were also included in Block 2 of the analysis.

<u>Analysis for Hypothesis 3.2:</u> Among the male subsample (n = 67), problem gambling severity, subjective goals, drive, and reward responsiveness will be most predictive of chasing decision among the major study variables.

The investigator explored this hypothesis using multiple forward logistic regression techniques. This analysis, run on the male subsample (n = 67), assessed the

unique prediction of major study variables in Blocks 1 and 2 that proved significant (p < .05) during preliminary analyses on chasing decision. Interaction terms that proved significant were also included in Block 2 of the analysis.

<u>Analysis for Hypothesis 3.3:</u> Among the female subsample (n = 53), problem gambling severity, subjective goals, and behavioral inhibition will be most predictive of chasing decision among the major study variables.

The investigator explored this hypothesis using multiple forward logistic regression techniques. This analysis, run on the total sample (n = 53), assessed the unique prediction of major study variables in Blocks 1 and 2 that proved significant (p < .05) during preliminary analyses on chasing decision. Interaction terms that proved significant were also included in Block 2 of the analysis.

<u>Analysis for Hypothesis 3.4:</u> Among the overall sample, gender, problem gambling severity, and subjective goals will be most predictive of chasing spins among the major study variables.

The investigator explored this hypothesis using multiple linear regression techniques. This analysis, run on the total sample (N = 121), assessed the unique prediction of major study variables in Blocks 1 and 2 that proved significant (p < .05) during preliminary analyses on chasing decision. Interaction terms that proved significant were also included in Block 2 of the analysis.

<u>Analysis for Hypothesis 3.5:</u> Among the male subsample (n = 67), problem gambling severity, subjective goals, drive, and reward responsiveness will be most predictive of chasing spins among the major study variables.

The investigator explored this hypothesis using multiple linear regression techniques. This analysis, run on the male subsample (n = 67), assessed the unique prediction of major study variables in Blocks 1 and 2 that proved significant (p < .05) during preliminary analyses on chasing decision. Interaction terms that proved significant were also included in Block 2 of the analysis.

<u>Analysis for Hypothesis 3.6:</u> Among the female subsample (n = 53), problem gambling severity, subjective goals, and behavioral inhibition will be most predictive of chasing spins among the major study variables.

The investigator explored this hypothesis using multiple linear regression techniques. This analysis, run on the total sample (n = 53), assessed the unique prediction of major study variables in Blocks 1 and 2 that proved significant (p < .05) during preliminary analyses on chasing decision. Interaction terms that proved significant were also included in Block 2 of the analysis.

Chapter 4: Results

This chapter will present the results of preliminary analyses, multiple logistic regressions, and multiple linear regressions to better understand the relationship between subjective and objective goal setting, loss/win conditions, demographic and dispositional characteristics, and chasing behavior (decision to chase, chasing spins). Separate multiple logistic regressions predicting decision to chase will be presented for the overall sample, male participants, and female participants. In addition, separate multiple linear regressions will be presented for the overall sample, males, and females.

Preliminary Analyses

Age and Gender

The sample (N = 121) ranged in age from 18 to 40 (M = 19.78, SD = 2.75). Slightly more males (n = 67, 55.4%) participated in the study than females (n = 53, 43.8%); one participant (n = 1, 0.8%) preferred not to indicate their gender.

Chasing Spins Transformation

Chasing spins was non-normally distributed with skewness of 2.69 (SE = 0.22) and kurtosis of 10.10 (SE = 0.44). Therefore, all chasing spins results (bivariate and multivariate analyses) will be reported using 'chasing spins (Ln),' which transformed the raw version with a natural log transformation (Ln) (M = 1.46, SD = 1.41).

Problem Gambling Severity

Participants were classified by level of gambling severity according to the Problem Gambling Severity Index of the Canadian Problem Gambling Inventory/Index (CPGI: Ferris & Wynne, 2001). The CPGI classification uses the Problem Gambling Severity Index and results in four groups: non-problem gamblers (PGSI = 0), low-risk gamblers (PGSI = 1 – 2), moderate-risk gamblers (PGSI = 3 – 7), and problem gamblers (PGSI 8 – 27). Among the overall sample, low-risk gamblers (n = 52, 43.0%) were the most represented, followed by moderate-risk gamblers (n = 36, 29.8%), non-problem gamblers (n = 26, 21.5%), and problem gamblers (n = 7, 5.8%). There were no significant differences in problem gambling severity status by gender. See Table 3 for a breakdown of problem gamblers in the sample (n = 7), the degree of problem gambling severity was also examined. The total score on the Canadian Problem Gambling Index (Ferris & Wynne, 2001) was used to assess the degree of problem gambling severity. Scores ranged from 0 – 27 on the nine-item scale (M = 2.47, SD = 2.50). The degree of problem gambling severity did not differ significantly by gender.

Gambling Expectations for Play

Participants were asked about their financial expectations for that day's gambling session, which ranged from 'not lose any money' to 'win a lot of money' (M = 4.87, SD = 1.36). Nearly three-quarters (n = 86, 72.9 %) of the participants reported goals for play 'to win money', while a minority (n = 16, 13.6 %) reported motivations of playing to 'not lose money'. An additional minority (n = 16, 13.6%) reported a goal of 'breaking even' during play. Male participants (M = 5.27, SD = 1.08) were more likely than females to have higher expectations for play F(2, 115) = 7.46, p = .001. There were no significant differences by level of gambling severity for gambling expectations for the overall sample, for males, or for females. In addition, there were no significant relationships observed between the degree of problem gambling severity and gambling expectations among the overall sample, or when conducting separate analyses by gender.

Ethnicity

The majority of participants were of Caucasian or European Origin (n = 68, 56.2%). Asian ethnicity was largest minority group (n = 12, 9.9%). Multi-ethnic background (n = 11, 9.1%), Middle Eastern (n = 10, 8.3%), Black (n = 8, 6.6%), South Asian (n = 6, 5.0%), South East Asian (n = 3, 2.5%), and Hispanic and South American Origin (n = 3, 2.5%) comprised the remainder of the sample.

Sample sizes were small for each of the minority groups; therefore ethnicity status was dichotomized as Caucasian/European Origin (n = 68, 56.2%) and Other Ethnic Origin (n = 53, 43.8%). Among Caucasians/Europeans, low-risk gamblers (n = 34, 50.0%) made up the largest percentage, followed by moderate-risk gamblers (n = 20, 29.4%), non-problem gamblers (n = 13, 19.1%), and problem gamblers (n = 1, 1.5%). Among Other Ethnic Origin participants, low-risk gamblers (n = 18, 34.0%) made up the largest percentage, followed by moderate-risk gamblers (n = 16, 30.2%), non-problem gamblers (n = 13, 24.5%), and problem gamblers (n = 6, 11.3%). There were no significant differences for the level of problem gambling severity by ethnicity among the overall sample or when conducting separate analyses by gender. See Table 3 for a breakdown of problem gambling severity status groups by ethnicity.

There was a significant between-group difference for ethnic status with the degree of problem gambling severity. Participants of Other Ethnic Origin (M = 2.98, SD = 3.09) were more likely than participants of Caucasian/European Origin to have higher degrees of problem gambling severity, F(1, 119) = 4.01, p = .047. Males of Other Ethnic Origin (M = 3.82 SD = 3.40) were more likely than males of Caucasian/European Origin to report higher degrees of problem gambling severity F(1, 65) = 5.36, p = .024. Among females, there were no significant between-group differences by ethnicity for the degree of problem gambling severity or by level of problem gambling severity by ethnic status.

Problem Gambling Severity Status Groups								
Variable	Non-	Low-Risk	Moderate-	Problem (n	Total ($N =$			
	Problem (n	(n = 52)	Risk ($n =$	= 7)	121)			
	= 26)		36)					
Gender (n.s.)								
Male								
Ν	11	31	20	5	67			
%	16.4%	46.3%	29.9%	7.5%	100.0%			
Female								
Ν	14	21	16	2	53			
%	26.4%	39.6%	30.2%	3.8%	100.0%			
Prefer not to say								
Ν	1	0	0	0	1			
%	100.0%	0.0%	0.0%	0.0%	100.0%			
Ethnicity (n.s.)								
Caucasian/European	Origin							
Ν	13	34	20	1	68			
%	19.1%	50.0%	29.4%	1.5%	100.0%			
Other Ethnic Origin	Other Ethnic Origin							
Ν	13	18	16	6	53			
%	24.5%	34.0%	30.2%	11.3%	100.0%			

Table 3 Level of problem gambling severity status by gender and ethnicity among the overall sample

Note. All relationships between level of problem gambling severity, gender, and ethnicity were insignificant. Gender was coded as follows: males = 1, females = 2, and prefer not to say = 3. Ethnicity was dummy-coded into Caucasian/European Origin = 0 and Other Ethnic Origin = 1 due to small sample sizes among all minority groups. Level of Problem Gambling Severity Status was coded using the Canadian Problem Gambling Index classification system (Ferris & Wynne, 2001) in the following manner: non-problem gamblers (PGSI = 0); low-risk gamblers (PGSI = 1 – 2); moderate-risk gamblers (PGSI = 3 - 7); problem gamblers (PGSI = 8 - 27).

Participants reported their subjective goals (i.e., importance of achieving their gambling goals) for their laboratory gambling session (M = 4.02, SD = 1.38). By gender, males (M = 4.31, SD = 1.55) were more likely than females to endorse higher subjective goal setting scores, F(2, 118) = 3.41, p = .036. See Table 5 for subjective goal setting descriptive statistics broken down by gender.

The degree of problem gambling severity was significantly related to the degree of subjective goals among the overall sample (r = .33, p < .001), for males (r = .28, p =.022), and for females (r = .34, p = .012). When conducting analyses by level of problem gambling severity status, a significant between-group difference was observed for subjective goals by level of problem gambling severity status, F(3, 117) = 4.97, p = .003. Post-hoc analyses using Bonferroni corrections demonstrated that moderate-risk gamblers were more likely than non-problem gamblers to endorse higher levels of subjective goal setting (p = .002). All other between-group differences by level of problem gambling severity status were non-significant. For males, there were no significant between-group differences in subjective goal setting by level of problem gambling severity. However, for females there were significant between-group differences, F(3, 49) = 4.08, p = .012; Bonferroni correction procedures demonstrated that moderate-risk gamblers had higher subjective goals than non-problem gamblers (p = .012); in addition, low-risk female gamblers reported higher subjective goals compared to non-problem female gamblers (p = .045).

There were no significant between-group differences for subjective goals by ethnic status among the overall sample or when conducting separate analyses by gender.

Objective Goal Setting Condition

A similar number of participants were randomly assigned to the 'specific and challenging' (experimental) condition (n = 61, 50.4%) and the 'do your best' (control) condition (n = 60, 49.6%). There were no significant differences in decision to chase or for the degree of chasing spins (Ln). Separate analyses were conducted by gender; all interactions for males and females between objective goal setting condition and both chasing decision and chasing spins (Ln) failed to meet significance. See Table 4 for a breakdown of chasing decision by objective goal setting condition.

Loss/Win Condition

A similar number of participants were assigned to the 'loss' condition (n = 63, 52.1%), and 'win condition' (n = 58, 47.9%). Due to student scheduling limitations, random assignment was not employed for the loss/win condition; participants in the loss condition were initially recruited, followed by win condition participants. There were no significant differences for the overall sample for decision to chase or the degree of chasing spins (Ln). Separate analyses were also conducted by gender; all interactions for males and females between loss/win condition and chasing decision and chasing spins (Ln) failed to meet significance. See Table 4 for a breakdown of chasing decision by loss/win condition.

Decision to Ch	ase		
Variable	No	Yes	Total
Objective Goal	Setting Condition (n.s.)		
Do Your Best			
Ν	25	35	60
%	41.7%	58.3%	100.0%
Specific and Cl	nallenging		
N	29	32	61
%	47.5%	52.5%	100.0%
Total	54	67	121
Loss/Win Cond	lition (n.s.)		
Loss			
Ν	28	35	63
%	44.4%	55.6%	100.0%
Win			
Ν	26	32	58
%	44.8%	55.2%	100.0%
Total	54	67	121

Table 4 Level of decision to chase by objective goal setting condition and loss/win condition

Note. There were no significant group differences for decision to chase by objective goal setting or loss/win condition. Decision to chase was dummy-coded with No = 0 and Yes = 1, and was measured in response to both wins and losses. Objective goal setting condition was dummy-coded with do your best = 0 and specific and challenging = 1. Loss/win condition was dummy-coded with loss = 0 and win = 1.

Behavioral Approach and Behavioral Inhibition

Participants filled out both the Behavioral Approach (i.e., motivational style that represents going after a goal) and Behavioral Inhibition (i.e., motivational style that represents fear of falling short of a goal) Scales (BIS/BAS, Carver, 1994). The following subscales were given for behavioral approach: reward responsiveness (M = 3.50, SD = 0.40), fun-seeking (M = 3.14, SD = 0.53), and drive (M = 2.75, SD = 0.52). Behavioral inhibition was assessed in one scale (M = 2.90, SD = 0.52).

By gender, female participants (M = 3.11, SD = 0.53) were more likely than males to report higher levels of behavioral inhibition, F(2, 118) = 8.19, p = <.001. There were no significant differences by gender for reward responsiveness, drive, or fun-seeking,.

The degree of problem gambling severity was positively related to drive (r = .20, p = .028) among the overall sample, but all other behavioral approach and inhibition relationships were non-significant for the overall sample. When conducting separate analyses by gender, male participants demonstrated a positive relationship between the degree of problem gambling severity and reward responsiveness (r = .29, p = .017), the degree of problem gambling severity and the degree of their drive scores (r = .25, p = .043). Among females, all relationships between the degree of problem gambling severity and behavioral approach scales were insignificant.

No significant between-group differences were observed by level of problem gambling severity for reward responsiveness, drive, or fun-seeking. When conducting separate gender analyses for level of problem gambling severity, there was a significant between-group difference for male participants' drive scores (BAS) F(3, 63) = 2.78, p = .048. Post-hoc Bonferroni corrections demonstrated that moderate-risk male gamblers (*M*

= 2.90, SD = 0.41) were more likely than low-risk male gamblers to report higher levels of drive motivation (p = .045). All other analyses for level of problem gambling severity among males were insignificant. Among females, all analyses failed to yield betweengroup differences by level of problem gambling severity for any of the Behavioral Approach or Behavioral Inhibition subscales. See Table 5 for descriptive statistics by gender for all of the Behavioral Approach and Behavioral Inhibition subscales.

Table 5 Means and standard deviations for chasing spins, subjective goals, behavioral inhibition, and behavioral approach by gender and level of problem gambling severity status

	Males $(n = 67)$			Females $(n = 53)$				
Variable	N	M	SD	п	М	SD		
Chasing Spins								
Non-Problem	11	5.64	9.23	14	10.50	19.31		
Low-Risk	31	10.68	10.68	21	2.24	5.38		
Moderate-Risk	20	16.65	20.18	16	7.38	8.66		
Problem	5	16.20	14.81	2	3.50	4.95		
Total	67	12.04	14.52	53	6.02	11.77		
Subjective Goals								
Non-Problem	11	3.70	1.14	14	2.90	1.07		
Low-Risk	31	4.10	1.52	21	3.84	0.75		
Moderate-Risk	20	4.88	1.72	16	4.07	1.17		
Problem	5	4.73	1.29	2	4.00	0.00		
Total	67	4.31	1.55	53	3.67	1.06		
Behavioral Inhib	ition							
Non-Problem	11	2.83	0.57	14	3.26	0.37		
Low-Risk	31	2.65	0.41	21	3.07	0.58		
Moderate-Risk	20	2.79	0.47	16	3.01	0.57		
Problem	5	2.91	0.44	2	3.29	0.81		
Total	67	2.74	0.46	53	3.11	0.53		
BAS Reward Re	sponsiveness	S						
Non-Problem	11	3.38	0.42	14	3.63	0.26		
Low-Risk	31	3.34	0.32	21	3.61	0.35		
Moderate-Risk	20	3.54	0.34	16	3.51	0.64		
Problem	5	3.72	0.33	2	3.80	0.28		
Total	67	3.43	0.36	53	3.59	0.43		
BAS Drive								
Non-Problem	11	2.59	0.41	14	2.71	0.64		
Low-Risk	31	2.53	0.51	21	2.80	0.56		
Moderate-Risk	20	2.90	0.41	16	2.91	0.46		
Problem	5	2.80	0.48	2	3.63	0.18		
Total	67	2.67	0.48	53	2.84	0.56		
BAS Fun-Seekin	g							
Non-Problem	11	3.21	0.49	14	3.11	0.51		
Low-Risk	31	3.13	0.46	21	3.17	0.56		
Moderate-Risk	20	3.16	0.59	16	2.96	0.59		
Problem	5	3.25	0.66	2	3.63	0.53		
Total	67	3.16	0.51	53	3.10	0.56		

Note. Gender was coded in the following manner: males = 1, females = 2, and prefer not to say = 3. Level of Problem Gambling Severity Status was coded using the Canadian

Problem Gambling Index classification system (Ferris & Wynne, 2001) in the following manner: non-problem gamblers (PGSI = 0); low-risk gamblers (PGSI = 1 - 2); moderate-risk gamblers (PGSI = 3 - 7); problem gamblers (PGSI = 8 - 27). Chasing spins were measured in continuous form in response to both wins and losses. All other variables were measured in continuous form.

Chasing and Problem Gambling Severity (CPGI)

Overall, participants were more likely to chase (independent of wins or losses), with more than half of the participants deciding to continue following their first 30 spins (n = 67, 55.4%). Participants lost an average of \$2.33 before deciding to stop play (M = 9.31 spins, SD = 13.62). See Table 4 for descriptive statistics by gender for chasing spins. As outlined at that outset of this chapter, chasing spins was non-normally distributed with skewness of 2.69 (SE = 0.22) and kurtosis of 10.10 (SE = 0.44). Therefore, chasing spins was transformed using a natural log transformation into chasing spins (Ln) (M = 1.46, SD = 1.41). See Table 5 for chasing spins by gender and level of problem gambling severity, table 6 for chasing decision by level of problem gambling severity, and Table 8 for females' chasing decision by level of problem gambling severity.

Among the overall sample, the degree of problem gambling severity was positively related to decision to chase (r = .25, p = .006) and chasing spins (Ln) (r = .23, p = .010). Among females, the degree of problem gambling severity was positively related to decision to chase (r = .32, p = .022), but insignificantly related to chasing spins (Ln). The degree of problem gambling severity was not significantly related to chasing decision or chasing spins (Ln) among male participants.

By level of problem gambling severity, there was a significant between-group difference for deciding to chase, F(3, 117) = 4.31, p = .006. Post-hoc analyses using Bonferroni corrections demonstrated that moderate-risk gamblers were more likely to chase than non-problem gamblers (p = .003). All other group comparisons were non-

significant for decision to chase. Among females, between-group differences for level of problem gambling severity on decision to chase were also demonstrated, F(3, 49) = 3.94, p = .014; post-hoc Bonferroni corrections indicated that moderate-risk gamblers were more likely than low-risk gamblers to chase (p = .011). Among males, there was a significant between-group difference by level of problem gambling severity on decision to chase, F(3, 63) = 2.83, p = .046; however, all post-hoc Bonferroni corrections failed to meet significance. There were no significant between-group differences by problem gambling severity status for chasing spins (Ln) among the overall sample or upon conducting separate gender analyses.

Other Predictors and Chasing

Males (n = 47, 70.1%) were more likely to decide to chase than females (n = 20, 37.7%), F(2, 118) = 7.62, p = .001. Males also chased for more spins (M = 12.04, SD = 14.52) compared with females (r = .33, p = <.001).

Subjective goal setting showed a positive relationship with decision to chase (r = .28, p = .002), as well as the number of chasing spins (Ln) (r = .23, p = .013). For females, subjective goal setting scores were positively associated with decision to chase (r = .41, p = .002) and chasing spins (Ln) (r = .30, p = .028). Among males, the relationship between subjective goals and both chasing measures, i.e., chasing decision (r = .12, p = .337) and chasing spins (Ln) (r = .09, p = .467) were insignificant. Among the overall sample, the degree of winning expectations for play proved positively related to the decision to chase (r = .21 p = .024) but non-significantly related to the number of chasing spins (Ln). All separate gender analyses for winning expectations and chasing behavior proved insignificant.

There were no significant differences for decision to chase or chasing spins (Ln) by ethnicity among the overall sample or when conducting separate gender analyses.

There were no significant relationships observed between any of the behavioral approach or behavioral inhibition subscales with the decision to chase or chasing spins (Ln) among the overall sample or when assessing the female or male subsamples.

Decision to Chase $F(3, 117) = 4.31, p = .006$						
Variable	No	Yes	Total			
Problem Gambling S	everity Status					
Non-Problem ($n = 26$						
n	18	8	26			
%	69.2%	30.8%	100.0%			
Low-Risk ($n = 52$)						
n	24	28	52			
%	46.2%	53.8%	100.0%			
Moderate-Risk ($n = 3$	Moderate-Risk ($n = 36$)					
n	9	27	36			
%	25.0%	75.0%	100.0%			
Problem $(n = 7)$						
n	3	4	7			
%	42.9%	57.1%	100.0%			
All Participants ($N = 121$)						
n	54	67	121			
%	44.6.%	55.4%	100.0%			

Table 6 Level of decision to chase by level of problem gambling severity among the overall sample

Note. Post-hoc analyses using Bonferroni corrections demonstrated that moderate-risk gamblers were more likely to decide to chase than non-problem gamblers (p = .003). All other group comparisons were non-significant for decision to chase. Decision to chase was dummy-coded with No = 0 and Yes = 1, and was measured in response to both wins and losses. Level of Problem Gambling Severity Status was coded using the Canadian Problem Gambling Index classification system (Ferris & Wynne, 2001) in the following manner: non-problem gamblers (PGSI = 0); low-risk gamblers (PGSI = 1 – 2); moderate-risk gamblers (PGSI = 3 – 7); problem gamblers (PGSI = 8 – 27).

Decision to Chase $F(3, 63) = 2.83, p = .046$							
Variable	No	Yes	Total				
Problem Gambling S	everity Status						
Non-Problem ($n = 11$)						
n	7	4	11				
%	63.6%	36.4%	100.0%				
Low-Risk $(n = 31)$							
n	7	24	31				
%	22.6%	77.4%	100.0%				
Moderate-Risk ($n = 20$)							
n	4	16	20				
%	20.0%	80.0%	100.0%				
Problem $(n = 5)$	Problem $(n = 5)$						
n	2	3	5				
%	40.0%	60.0%	100.0%				
All Male Participants ($n = 67$)							
n	20	47	67				
%	29.9%	70.1%	100.0%				

Table 7 Level of decision to chase by level of problem gambling severity among male participants

Note. There were significant between-group differences by level of problem gambling severity; however, post-hoc Bonferroni correction procedures did not demonstrate any significant differences between two levels (e.g., moderate-risk compared to non-problem) for the decision to chase. Decision to chase was dummy-coded with No = 0 and Yes = 1, and was measured in response to both wins and losses. Level of Problem Gambling Severity Status was coded using the Canadian Problem Gambling Index classification system (Ferris & Wynne, 2001) in the following manner: non-problem gamblers (PGSI = 0); low-risk gamblers (PGSI = 1 - 2); moderate-risk gamblers (PGSI = 3 - 7); problem gamblers (PGSI = 8 - 27).

Decision to Chase $F(3, 49) = 3.94, p = .014$						
Variable	No	Yes	Total			
Problem Gambling S	everity Status					
Non-Problem ($n = 14$	4)					
n	10	4	14			
%	71.4%	28.6%	100.0%			
Low-Risk $(n = 21)$						
n	17	4	21			
%	81.0%	19.0%	100.0%			
Moderate-Risk ($n = 16$)						
n	5	11	16			
%	31.3%	68.8%	100.0%			
Problem $(n = 2)$						
n	1	1	2			
%	50.0%	50.0%	100.0%			
All Female Participants ($n = 53$)						
n	33	20	53			
%	62.3%	37.7%	100.0%			

Table 8 Level of decision to chase by level of problem gambling severity status among female participants

Note. Post-hoc Bonferroni corrections demonstrated that moderate-risk gamblers were more likely than low-risk gamblers to decide to chase (p = .011). Decision to chase was dummy-coded with No = 0 and Yes = 1, and was measured in response to both wins and losses. Level of Problem Gambling Severity Status was coded using the Canadian Problem Gambling Index classification system (Ferris & Wynne, 2001) in the following manner: non-problem gamblers (PGSI = 0); low-risk gamblers (PGSI = 1 – 2); moderate-risk gamblers (PGSI = 3 – 7); problem gamblers (PGSI = 8 – 27).

Multiple Logistic Regression Models Predicting Decision to Chase

Multiple logistic regression analyses were used to investigate the relative influence of predictor variables on the decision to chase among: 1) the overall sample (N= 121), 2) male participants (n = 67), and, 3) female participants (n = 53). Prior to conducting the three separate logistic regressions, predictor variables were assessed in preliminary analyses, with the aim to include only the predictor variables that proved significant (p < .05). Variables tested included: objective goal setting condition, loss/win condition, ethnicity, the three behavioral approach subscales, and behavioral inhibition. Dummy-coded variables included: gender, objective goal setting condition, loss/win condition, and ethnicity. Continuous variables included degree of problem gambling severity, subjective goals, and all of the behavioral approach and behavioral inhibition subscales. Problem gambling severity total score was used over level of problem gambling severity due to the limited sample size of problem gamblers in the study sample. Due to concerns of multicollinearity with subjective goal setting, the item assessing gambling expectations for play was excluded as a logistic regression predictor variable. Among the overall sample, gender, degree of problem gambling severity, and degree of subjective goals were significant predictors of decision to chase; both problem gambling severity and subjective goals were significant predictors among the female subsample; all variables were non-significant among the male subsample. For purposes of continuity, degree of problem gambling severity and subjective goals were included for the male subsample. Therefore all logistic regressions tested included (in Block 1) the degree of problem gambling severity, the degree of subjective goals, and (in Block 2) the interaction between degree of problem gambling severity and subjective goals

(theoretically driven interaction term). Gender was also tested as a predictor for the overall sample (in Block 1). Partial odds ratios (ORs) and 95% confidence intervals (CIs) were computed for all of the predictors. Model effects were estimated by a classification matrix identifying the proportion of participants correctly classified by the covariates of the model as well as by the improvement in chi-square.

Overall Sample Logistic Regression

In the overall sample analysis, significant predictors in Block 1 included gender, subjective goals, and degree of problem gambling severity. The same three predictors were included in Block 2 alongside a theoretically driven interaction term (i.e., subjective goals x problem gambling severity). Results of the multiple logistic regression produced an adequate model fit in Block 1, correctly classifying 73.6% of the cases. Male gender (p = .003) was the only predictor variable that remained significant in Block 1 when accounting for the other significant predictor variables. Males were 3.2 times more likely to chase than females. Subjective goals showed trend significance (p = .061) in Block 1 with every one unit of increase in subjective goals resulting in 1.4 times the likelihood of deciding to chase. The degree of problem gambling severity was non-significant (p =.131). The Hosmer-Lemeshow goodness-of-fit statistic also proved the model was adequate, $x^{2}(8, N = 121) = 12.86$, p = .117. When including the interaction term in Block 2, male gender (p = .003) proved predictive of decision to chase, with males 3.3 times more likely to chase than females, every one unit of increase in subjective goals (p =.051) resulted in 1.4 times the likelihood of deciding to chase, and every one unit of increase in the degree of problem gambling severity (p = .089) resulted in 1.2 times the likelihood of deciding to continue play. The number of correctly classified cases

increased to 74.4% and the Hosmer-Lemeshow goodness-of-fit statistic also indicated an improved model fit, x^2 (8, N = 121) = 11.46, p = .177. Results are presented in Table 9. Due to the significant gender differences evidenced in the overall sample, the author determined it was necessary to conduct separate multiple forward logistic regressions for the male (n = 67) and female (n = 53) subsamples.

Predictor Variable	В	SE	Wald x^2	р	ORs	CIs
Without interaction term						
Male Gender	-1.17	0.40	8.58	.003**	3.22	.1468
Subjective Goals	0.33	0.17	3.52	.061	1.39	.99-1.95
Problem Gambling Severity	0.14	0.10	2.28	.131	1.15	.96-1.39
With interaction term						
Male Gender	-1.21	0.41	8.73	.003**	3.34	.1367
Subjective Goals	0.35	0.18	3.81	.051	1.42	1.00-2.03
Problem Gambling Severity	0.17	0.10	2.89	.089	1.18	.97-1.44
Subjective Goals x Problem Gambling Severity	-0.12	0.07	3.06	.080	1.13	.78-1.01
Block 1 73.6% correctly classified; Hosmer-Lemeshow x^2 (8, $N = 121$) = 12.86, $p = .117$. Block 2 74.4% correctly classified; Hosmer-Lemeshow x^2 (8, $N = 121$) = 11.46, $p = .177$.						
<i>Note.</i> *** <i>p</i> <.001, ** <i>p</i> <.	01, * <i>p</i> <.05	5.				

Table 9 Logistic regression predicting decision to chase with and without interaction term among the overall sample

Note. All predictors demonstrated significant (p < .05) relationships with decision to chase in preliminary analyses.

Note. CIs = 95% confidence intervals and ORs = odds ratios. Positive coefficients indicate increased likelihood to decide to chase, negative coefficients indicate decreased likelihood to decide to chase.

Multiple Logistic Regression Analyses Predicting Decision to Chase Among Males

Among males (n = 67), all of the predictor variables failed to prove significantly related to decision to chase in preliminary analyses. For purposes of continuity with the overall sample and female subsample, subjective goals and problem gambling severity were included in Block 1, while the interaction between subjective goals and problem gambling severity was included in Block 2. Results of the multiple logistic regression in Block 1 correctly classified 70.1% of the cases, and provided an adequate model fit according to the Hosmer-Lemeshow goodness-of-fit x^2 (7, n = 67) = 10.50, p = .162. Both predictors proved to be insignificant in Block 1. When including the interaction term in Block 2, the model correctly classified 74.6% of the cases. The Hosmer-Lemeshow goodness-of-fit statistic demonstrated a good model fit x^2 (8, n = 67) = 11.46, p = .177. Neither the predictor variables nor interaction term approached significance in Block 2. Results are presented in Table 10.

Predictor Variable	В	SE	Wald x^2	р	ORs	CIs
Without interaction term						
Subjective Goals	0.14	0.19	0.51	.475	1.15	.79-1.66
Problem Gambling Severity	0.09	0.11	0.61	.434	1.09	.88-1.36
With interaction term						
Subjective Goals	0.20	0.21	0.93	.336	1.22	.81-1.83
Problem Gambling Severity	0.15	0.13	1.34	.248	1.16	.90-1.50
Subjective Goals x Problem -0.12 0.08 2.29 .130 1.12 .77-1.04 Gambling Severity						
Block 1 70.1% correctly classified; Hosmer-Lemeshow x^2 (7, $n = 67$) = 10.50, $p = .162$. Block 2 74.6% correctly classified; Hosmer-Lemeshow x^2 (8, $n = 67$) = 11.46, $p = .177$.						
<i>Note.</i> *** <i>p</i> <.001, ** <i>p</i> <.01,	* <i>p</i> <.05.					

Table 10 Logistic regression predicting decision to chase with and without interaction term among the male subsample

Note. CIs = 95% confidence intervals and ORs = odds ratios. Positive coefficients indicate increased likelihood to decide to chase, negative coefficients indicate decreased likelihood to decide to chase.
Multiple Logistic Regression Analyses Predicting Decision to Chase Among Females

Among females (n = 53), significant predictors for Block included subjective goals and problem gambling severity. An interaction term for subjective goals and problem gambling severity was included in Block 2. Results of the multiple logistic regression produced a good model fit in Block 1, correctly classifying 71.7% of the cases. Subjective goal setting (p = .018) was the only significant predictor, with every unit of increase in subjective goals resulting in 2.4 times the likelihood of deciding to chase. The Hosmer-Lemeshow goodness-of-fit statistic also indicated a good model fit, x^2 (8, n = 53) = 4.50, p = .810. When adding in the interaction term in Block 2, the model remained adequate, still correctly classifying 71.7% of the cases. The Hosmer-Lemeshow goodness-of-fit statistic also demonstrated an adequate model fit x^2 (8, n = 53) = 7.28, p =.507. Results of the multiple forward logistic regression are presented in Table 11.

Predictor Variable	В	SE	Wald x^2	р	ORs	CIs
Without interaction term						
Subjective Goals	0.88	0.37	5.61	.018*	2.41	1.16-4.99
Problem Gambling Severity	0.23	0.17	1.88	.171	1.26	.91-1.76
With interaction term						
Subjective Goals	0.94	0.40	5.64	.018*	2.57	1.18-5.60
Problem Gambling Severity	0.24	0.18	1.91	.167	1.27	.90-1.80
Subjective Goals x Problem Gambling Severity	0.13	0.21	0.37	.542	1.14	.75-1.71
Block 1 71.7% correctly classified; Hosmer-Lemeshow x^2 (8, $n = 53$) = 4.50, $p = .810$. Block 2 71.7% correctly classified; Hosmer-Lemeshow x^2 (8, $n = 53$) = 7.28, $p = .507$.						
<i>Note.</i> *** <i>p</i> <.001, ** <i>p</i> <.01, * <i>p</i> <.05.						

Table 11 Logistic regression predicting decision to chase with and without interaction term among the female subsample

Note. All predictors demonstrated significant (p < .05) relationships in preliminary analyses.

Note. CIs = 95% confidence intervals and ORs = odds ratios. Positive coefficients indicate increased likelihood to decide to chase, negative coefficients indicate decreased likelihood to decide to chase.

Multiple Linear Regression Models Predicting Chasing Spins (Ln)

Multiple linear regression analyses were used to investigate the relative influence of predictor variables on the degree of chasing spins (Ln) among: 1) the overall sample (N = 121), 2) male participants (n = 67), and, 3) female participants (n = 53). Prior to conducting the three separate linear regressions, predictor variables were assessed in preliminary analyses, with the aim to include only the predictor variables that proved significant (p < .05). Variables tested included: objective goal setting condition, loss/win condition, ethnicity, the three behavioral approach subscales, and behavioral inhibition. Dummy-coded variables included: gender, objective goal setting condition, loss/win condition, and ethnicity. Continuous variables included degree of problem gambling severity, subjective goals, and all of the behavioral approach and behavioral inhibition subscales. Problem gambling severity total score was used over level of problem gambling severity due to the limited sample size of problem gamblers in the study sample. Due to concerns of multicollinearity with subjective goal setting, the item assessing gambling expectations for play was excluded as a linear regression predictor variable. Among the overall sample, gender, degree of problem gambling severity, and degree of subjective goals were significant predictors of chasing spins (Ln); subjective goals were the only significant predictor of chasing spins (Ln) among the female subsample; all variables were non-significant predictors for chasing spins (Ln) among the male subsample. For purposes of continuity, degree of problem gambling severity and subjective goals were included in both the male and female subsample linear regression analyses. Therefore all linear regressions tested included (in Block 1) the degree of problem gambling severity, the degree of subjective goals, and (in Block 2) the

interaction between degree of problem gambling severity and subjective goals (theoretically driven interaction term). Gender was also tested as a predictor for the overall sample (in Block 1). R-square will be reported to estimate the amount of variance predicted by the model, and significance values will be reported for each block.

Multiple Linear Regression Analyses Predicting Chasing Spins (Ln) Among the Overall Sample

In the overall sample analyses, significant predictors in Block 1 included gender, subjective goals, and degree of problem gambling severity. The same three predictors were included in Block 2 alongside a theoretically driven interaction term (i.e., subjective goals x problem gambling severity). The model used in Block 1 was significant F(3, 3)117) = 6.91, p < .001, with 15.1% of the variance accurately predicted ($R^{2^{=}}.151$). In Block 1, male gender (p = .002) was the only significant predictor of chasing spins (Ln), both problem gambling severity (p = .137) and subjective goals (p = .210) failed to approach significance. The model was also significant in Block 2 after inclusion of the interaction term, F(4, 116) = 5.55, p < .001, with 16.1% of the variance predicted (R^{2} = .161). Similar to Block 1, only male gender (p = .002) significantly predicted chasing spins (Ln); problem gambling severity (p = .091) approached significance, and subjective goals (p = .165) was insignificantly related to chasing spins (Ln). Results are presented in Table 12. Due to the significant gender differences evidenced in the overall sample, the author determined it was necessary to conduct separate multiple linear regressions for the male (n = 67) and female (n = 53) subsamples.

Predictor Variable	В	SE	t	р
Without interaction term				
Male Gender	-1.17	0.40	8.58	.003**
Subjective Goals	0.33	0.17	3.52	.061
Problem Gambling Severity	0.14	0.10	2.28	.131
With interaction term				
Male Gender	-1.21	0.41	8.73	.003**
Subjective Goals	0.35	0.18	3.81	.051
Problem Gambling Severity	0.17	0.10	2.89	.089
Subjective Goals x Problem Gambling Severity	-0.12	0.07	3.06	.080
Block 1: $R^{2=}$.151 ($N=1$ Block 2: $R^{2=}$.161 ($N=1$)	21, <i>p</i> <.001) 21, <i>p</i> <.001)			
<i>Note.</i> *** <i>p</i> <.001, ** <i>p</i> <	<.01, * <i>p</i> <.05	5.		

Table 12 Linear regression predicting chasing spins (Ln) with and without interaction term among the overall sample

Note. All predictors demonstrated significant (p < .05) relationships with chasing spins (Ln) in preliminary analyses.

Note. Positive coefficients indicate increased likelihood to decide to chase, negative coefficients indicate decreased likelihood to decide to chase.

Multiple Linear Regression Analyses Predicting Chasing Spins (Ln) Among the Male Subsample

In the male subsample analyses, theoretically important predictors, i.e., subjective goals, problem gambling severity, were included as all predictors failed to meet significance in preliminary analyses. The same two predictors were included in Block 2 alongside a theoretically driven interaction term (i.e., subjective goals x problem gambling severity). The model used in Block 1 was insignificant F(2, 64) = 1.63, p =.203, with 4.9% of the variance accurately predicted ($R^{2=}.049$). In Block 1, both problem gambling severity (p = .104) and subjective goals (p = .803) failed to approach significance. The model was also insignificant in Block 2 after inclusion of the interaction term, F(3, 63) = 1.61, p = .195, with 7.1% of the variance predicted ($R^{2=}$.071). Problem gambling severity (p = .055) approached significance in Block 2, while subjective goals (p = .571) remained insignificantly related to chasing spins (Ln). Results are presented in Table 13.

Predictor Variable	В	SE	t	р
Without interaction term				
Subjective Goals	0.03	0.11	0.25	.803
Problem Gambling Severity	0.10	0.06	1.65	.104
With interaction term				
Subjective Goals	0.06	0.12	0.57	.571
Problem Gambling Severity	0.13	0.07	1.96	.055
Subjective Goals x Problem Gambling Severity	-0.05	0.04	-1.24	.218
Block 1: R^{2} = .049 (n = 67 Block 2: R^{2} = .071 (n = 67	p = .203). p = .195).			
<i>Note.</i> *** <i>p</i> <.001, ** <i>p</i> <	.01, * <i>p</i> <.05	5.		

Table 13 Linear regression predicting chasing spins (Ln) with and without interaction term among the male subsample

Note. Neither subjective goals nor problem gambling severity demonstrated a significant (p < .05) relationship with chasing spins (Ln) in preliminary analyses.

Note. Positive coefficients indicate increased likelihood to decide to chase, negative coefficients indicate decreased likelihood to decide to chase.

Multiple Linear Regression Analyses Predicting Chasing Spins (Ln) Among the Female Subsample

In the female subsample analyses, both subjective goals and problem gambling severity were included for purposes of continuity with the other multiple linear regressions, despite only subjective goals demonstrating a significant relationship with chasing spins (Ln) in preliminary analyses. The same two predictors were included in Block 2 alongside a theoretically driven interaction term (i.e., subjective goals x problem gambling severity). The model used in Block 1 approached significance F(2, 50) = 2.51, p = .901, with 9.1% of the variance accurately predicted ($R^{2=}.091$). In Block 1, subjective goals (p = .042) was the only significant predictor, while problem gambling severity (p = .966) failed to approach significance. The model was also insignificant in Block 2 after inclusion of the interaction term, F(3, 49) = 1.75, p = .170, with 9.7% of the variance predicted ($R^{2=}.097$). Subjective goals (p = .038) remained significant after the inclusion of the interaction term, and problem gambling severity (p = .924) was again insignificantly related to chasing spins (Ln). Results are presented in Table 14.

Predictor Variable	В	SE	t	р	
Without interaction term					
Subjective Goals	0.38	0.18	2.09	.042*	
Problem Gambling Severity	0.00	0.01	0.04	.966	
With interaction term					
Subjective Goals	0.42	0.20	2.13	.038*	
Problem Gambling Severity	0.01	0.10	0.10	.924	
Subjective Goals x Problem Gambling Severity	0.05	0.09	0.53	.596	
Block 1: $R^{2^{=}}.091$ ($n = 53, p = .091$). Block 2: $R^{2^{=}}.097$ ($n = 53, p = .170$).					
<i>Note.</i> *** <i>p</i> <.001, ** <i>p</i> <.01, * <i>p</i> <.05.					

Table 14 Linear regression predicting chasing spins (Ln) with and without interaction term among the female subsample

Note. Subjective goals demonstrated a significant (p < .05) relationship with chasing spins (Ln) in preliminary analyses.

Note. Positive coefficients indicate increased likelihood to decide to chase, negative coefficients indicate decreased likelihood to decide to chase.

Results Summary

The results of this dissertation provide foundational findings regarding the role of subjective goals and chasing behavior. Preliminary analyses of the overall sample demonstrated positive relationships for male status, higher degrees of subjective goals, and higher reports of problem gambling severity with decision to chase and the degree of chasing spins (Ln). Participants of Other Ethnic Origin were more likely than Caucasian participants to chase for more spins and to report higher degrees of problem gambling severity; the effect of higher problem gambling severity among minorities was driven primarily by males of minority status. In addition, subjective goals and problem gambling severity were positively related among the overall sample, as well as among male and female participants.

The overall sample multivariate analysis indicated that only male status remained significantly related to chasing decision and the degree of chasing spins (Ln). By gender, male participants had significantly higher reports of both subjective goals, the number of chasing spins, and an increased frequency of deciding to chase than females. However, no significant predictors were demonstrated in preliminary or multivariate analyses among males predicting decision to chase or the degree of chasing spins (Ln). Among the female subsample, both subjective goals and problem gambling severity were positively related to decision to chase in preliminary analyses, though only the degree of subjective goals proved positively related to the degree of chasing spins (Ln). Multivariate analyses revealed that only the degree of subjective goals remained significantly related to both decision to chase and the degree of chasing spins (Ln).

Chapter 5: Discussion

This chapter will discuss the substantive value of the findings outlined in this dissertation regarding goal setting and chasing behavior in the field of recreational and disordered gambling. This chapter will also review the implications of these findings for social work policy and practice; address limitations in study design, and provide directions for future research to build off of this dissertation.

The purpose of this dissertation was to investigate the relationship of two forms of goal setting – subjective and objective – to chasing behavior during slot machine play in an immersive and controlled laboratory setting. Goal setting was tested as both a trait-based variable (subjective goals set by individual expectations) and state-based variable (objective goal setting influenced by external factors). The study also explored the potential influence of prior wins and losses on these factors, assessed through nominal wins and losses during play, in order to better understand differences in chasing in direct response to gambling outcomes. As in prior studies with a college-age population (see, e.g., Nower et al., 2004), there were significant differences by gender, so analyses were conducted on the entire sample and then by gender in order to better evaluate the significant predictors of individuals who chase while gambling.

In addition to gender, this study also accounted for dispositional and demographic factors such as, ethnicity, problem gambling severity, and personality variables, identified in prior research studies as associated with problem gambling behavior, as well as significant interactions between these variables and goal setting and win/loss conditions. Overall, males were more likely than females to chase (i.e. chase following wins or losses) beyond the normal gambling period. This finding is consistent with a majority of

106

studies in the research literature that find higher rates of problem gambling among males compared to females.

Unlike subjective goals (H1.1, 1.2), objective goal setting failed to demonstrate any significant relationship with either the decision to chase or chasing spins among the overall sample (H1.3, 1.4), or when conducting separate analyses by gender. In addition, there were no significant relationships with objective goal setting condition and loss/win condition, demographic (gender, ethnicity), or dispositional factors (behavioral approach and inhibition, problem gambling severity) among the overall sample or among male or female participants. A non-significant trend for more frequent decision to chase was observed for the "specific and challenging" condition and reward responsiveness among the male subsample, all other interactions proved insignificant. It should be noted that the experimental script read by participants was not validated in any prior research. To the author's knowledge, this study was the first to randomize participants to an objective goal setting condition in the field of recreational and disordered gambling. It is, therefore, possible that the scripts were ineffective in encouraging participants to set objective goals. It is also possible that the script may have yielded meaningful results if participants spent a longer time (e.g. five minutes versus 30 seconds) reading the script. Alternatively, the language used in the script may have been more effective if it emphasized a higher objective goal, e.g., "one participant hit the jackpot and finished up \$30" compared to stating the average participant finished up \$2.40 at the end of their gambling session. Another possibility is that objective goal setting may be more relevant in game types where external influences such as the success of others are inherently part of the game type, e.g., poker, sports betting against peers. However, it is also possible that subjective

trait-based goals may be more relevant to gamblers than externally influenced state-based goals, i.e., the influence of setting one's own subjective goals would always prove more effective than the use of an experimental script, because the gambler felt more control over the goal setting and, therefore, more motivation to reach the goal s/he set. Future research should attempt to influence objective goals with a few different variations of a script, pilot test the scripts to establish the most robust script, and assess the impact of the strongest objective goal setting scripts for both 'specific and challenging' and 'do your best' goals. A replication study using the current subjective goal setting scale would be useful in further contextualizing these findings and better understanding the relationship of subjective goal setting to chasing and problem gambling behavior.

The loss/win condition likewise failed to demonstrate significant differences in chasing behavior (H2.1, 2.2) in the overall sample or by gender. In addition, there were no significant interactions between loss/win condition and subjective or objective goal setting, demographic factors (gender, ethnicity) or dispositional factors (behavioral approach and inhibition, problem gambling severity). The loss/win condition was possibly limited in that this was the first time this script of nominal wins and losses was used. It is possible that the loss/win ratios were not significantly different enough over the course of 30 spins to influence more chasing or chasing for more spins. As outlined in the methodology section, the decision to use smaller wins and losses was driven by ethical concerns about encouraging gambling-related cognitive distortions via an experience of big wins; however, this decision may have accounted for the non-significant outcomes in the study. In addition, the VR slot machine software's default parameter for bet size was 1 credit per spin. To keep all factors equal and control for

extraneous differences, the team felt less behavioral variation would be observed when instructing to use the default of 1 credit per spin as compared to instructing participants to increase their bet size in an idiosyncratic fashion or to up to the maximum bet size allowed by the VR software (3 credits) which would require additional keystrokes. One possible solution would be to have participants play for less spins, thereby making the contrast in loss/win experience more distinct, however, the team wanted to provide a realistic slot machine experience that emphasized translational validity to the field of recreational and disordered gambling. Future research should pilot a variety of different loss/win scripts, e.g., vary the size of maximum bets, allow participants to choose their own maximum bet size, compare scripts with a different number of spins, and compare scripts with different magnitudes of losses and wins while being mindful of ethical concerns related to big wins.

This dissertation used a goal-setting theoretical framework to guide the study hypotheses (Heath et al., 1999); Heath and colleagues' (1999) goal setting framework was informed by the principles of Prospect Theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). The three principles outlined by the goal-setting framework include 1) the goal or reference point, 2) loss aversion, and 3) diminishing sensitivity. This project tested two different types of goals (the degree of subjective goals, an experimentally induced objective goal condition) to investigate chasing behavior differences in response to both trait and state-based goals. The author theorized that chasing behavior would be driven by higher goals due to loss aversion (more chasing when below a goal then chasing in response to wins when ahead of goal), and chasing should be exacerbated when the relative distance from the goal is less (diminishing sensitivity). The study found support for trait-based goals driving chasing behavior (H1. 1.2), did not find support for state-based goals predicting chasing behavior (H1.3, 1.4). The study did not find support for loss aversion in response to loss/win condition (H2.1, 2.2). The findings offered mixed support for diminishing sensitivity. A higher degree of subjective goals led to an increased vulnerability for deciding to chase and the number of chasing spins (H1, 1.2), which may in part be due to less relative impact of each subsequent loss. In addition, the degree of winning expectations was positively related to deciding to chase. However, the relationship was not significant for objective goal setting condition and chasing behavior (H1.3, 1.4). These findings offer preliminary support for the notion that the importance of achieving goals (subjective goals), "It is important for me to win more money than others," drives chasing behavior more than explicit goal setting (objective goal setting) "I want to win an extra \$5." Future research could offer participants a variety of goal setting options, "I want to double my money" or "I want to turn my 80 credits into credits by the end of the gambling session" to better understand the specificity of gambling goals and their relationship with chasing behavior.

Demographic and dispositional factors provided additional information about important interactions and allowed an investigation of goal setting and chasing behavior with relevant etiological factors accounted for in multivariate models. Males were more likely to decide to chase and chase for more spins than females, to set a higher degree of subjective goals and winning expectations for play, while female participants reported higher levels of behavioral inhibition. Notably, a majority of males (70.1%) chased, therefore, the effect of male chasing may have been limited by a ceiling effect. Among the male subsample, only the degree of problem gambling severity demonstrated a nonsignificant trend with chasing spins in preliminary analyses. Among the female subsample, both subjective goals and problem gambling severity were positively related to the decision to chase and the number of chasing spins although, when accounting for all significant predictors in multivariate analyses, only the degree of subjective goals predicted both forms of chasing behavior among female participants. Participants of minority status were more likely than Caucasian participants to report higher problem gambling severity scores (males in particular) as well as to chase for more spins. Participants of Other Ethnic Origin were over-represented in problem gambler status classification (n = 6), though the number of problem gamblers (n = 7) in the study limited the power of analyses comparing predictor variables of problem gambling classification status. Of note, male participants (n = 4, 14.3%) of minority status were the most overrepresented subgroup in terms problem gambling classification.

These findings demonstrate that subjective goal setting is a key factor in chasing behavior – particularly among female participants. Male participants set high goals for their play, but the experience of high goals and chasing among males was common enough that subjective goals failed to distinguish the decision to chase or chasing spins. However, higher subjective goals among females proved predictive of the decision to chase and the number of chasing spins. In this respect, subjective goals appear to be central to male gambling behavior, and, therefore, fail to differentiate 'chasers' from 'non-chasers.' In contrast, subjective goal setting appears to be a discriminating factor for female gamblers, distinguishing 'chasers' from 'non-chasers'. This finding could have important implications for future prevention efforts with female youth gamblers as well as for treatment with female disordered gamblers, because it suggests that encouraging women to set lower and more realistic goals may have a protective effect and reduce subsequent harm. As expected, higher reports of problem gambling severity was related to chasing behavior among the overall and female subsample. As outlined by diagnostic criteria and gambling pathology screening instruments, chasing behavior is related to problem gambling severity. In this respect, these findings build on the notion that chasing behavior is a critical indicator of problem gambling severity.

Implications for Social Work Policy and Practice

Directions for Responsible Gambling Practices

Responsible gambling practices have theorized that encouraging limit-setting will be of benefit to gamblers. Some projects have outlined these practices for recreational gamblers and others have attempted to minimize harm among disordered or at-risk gamblers. The results thus far have largely been inconclusive and have consistently shown that most gamblers fail to set limits, let alone adhere to them. In addition, gamblers with higher levels of problem gambling severity are less likely to set or agree to set spending limits, and may set higher limits in response to imposed limitations.

This study assessed gambler motivation for play with an assessment administered immediately before play and found that nearly three out of every four players reported intending to win additional money with a minority indicating the goal was simply not to lose money or to break even during play. Male gamblers demonstrated a higher level of reward focus compared to female participants, irrespective of problem gambling severity. These findings suggest that most gamblers, irrespective of level or degree of problem gambling severity, are unlikely to set limits. Male gamblers may be even less likely limitsetters than females, given that their expectations for play showed a greater degree of focus on rewards. Contrary to the tenets of limit-setting interventions, players are not only likely to set goals for winning during play, but these goals are robustly associated with the decision to chase. Taken together, these findings underscore the need to develop responsible gambling practices that focus on modifying or shaping player goals rather than imposing limits that will be resisted or underutilized by players.

Implications for Social Work Policy & Practice

This dissertation identified subjective goals as a key factor in chasing behavior. This finding was particularly discerning for female gamblers. Historically, the field of social work has ignored gambling disorder, and few schools of social work nationwide provide any training or coursework on the identification and treatment of disordered gamblers. Most social work practitioners have little or no knowledge regarding the phenomenology of gambling disorder. Therefore, efforts in social work should begin with a fundamental acknowledgment of the impact of behavioral addictions, specifically gambling disorder, on the mental, physical, financial, and social health of individuals and communities, particularly the vulnerable populations best addressed by the social work profession. It is critical that social work educators begin including this disorder in psychopathology courses and/or addiction curriculum and cultivate research expertise in this area, similar to that in the fields of psychology and psychiatry. The recent acknowledgment of gambling disorder as an addiction in the DSM-5 (American Psychiatric Association, 2013) will hopefully alert social work educators to this disorder.

Educated social work clinicians and researchers, then, can work together to develop prevention efforts to help identify at-risk gamblers both male and female. Social workers employed in schools, homeless and domestic violence shelters, hospitals, and mental health facilities should all screen clients not only for substance use disorders but also for disordered gambling. Social workers are in the best position to drive policy initiatives aimed at protecting those most vulnerable to the development of gambling problems: adolescents and young adults, ethnic minorities, older adults, those under in chronic financial distress, and individuals with disabilities. The inclusion of gambling disorder into DSM-5 will likely signify an increased level of treatment delivery from social workers to those afflicted with gambling disorder.

These findings also highlight a potential avenue for treatment modifications, building upon the recent movement to promote more controlled gambling or harmreduction approaches to treatment-resistant subgroups that may otherwise reject abstinence-based approaches (Ladouceur, 2005). Taken together, the reward focus of most gamblers in this sample and the predictive value of subjective goals to chasing behavior, these findings suggest that the language of the gambler may be disproportionately slanted towards what players can get from gambling as opposed to what it can cost them. With this in mind, clinicians may be better served to work on modifying the positive values brought by gambling to clients as opposed to purely emphasizing the costs. In addition, clinicians working with at-risk youth, particularly girls, or women who gamble problematically could explore the relationship of goal setting to subsequent gambling behavior and educate the client on "reasonable" goal setting. Clinicians could also work with the client on establishing higher goals in domains in which they have more control of outcomes (e.g., occupational, scholastic, health). In effect, the clinician would help shift a client's high goals to a healthier domain, thereby replacing "unhealthy action" with "healthy action" and not by

attempting to reduce pathology without any adaptive replacement activity in which the client can set high goals for themselves.

Against this backdrop, the findings of this study support a strengths-based approach to harm reduction efforts. In contrast to limit-setting initiatives, which are largely punitive and/or restrictive in orientation, goal setting would allow for a positive reframe of such limitations, empowering the gambler to adjust goals to meet reasonable recreational expectations. Such a strengths-based focus is central to the philosophy and scholarship of social work, and social work scholars could potentially have a significant impact on the development of prevention, intervention, and treatment efforts as well as the development of strengths-based responsible gambling initiatives.

Limitations

This study has a number of limitations common to primary data collection with college convenience samples. First, the sample size was relatively small, particularly when splitting the sample by gender, and there were, therefore, a limited number of disordered gamblers. The overall sample size (N = 121) allowed for adequate power, however, when conducting separate gender analyses for males (n = 67) and females (n = 53), power was reduced. Still, these sample sizes provided enough participants to conduct separate analyses in both preliminary and multivariate analyses. The author used only significant predictors (p < .05) in the overall sample as well as when conducting separate analyses by gender. The study had a representative number of problem gamblers (n = 7, 5.8%) among the overall sample, though this number was insufficient to compare differences among problem gamblers and all other classifications of problem gambling severity status (moderate-risk, low-risk, non-problem). The field of disordered gambling

presents challenges in terms of effect size and power to run analyses comparing individuals with and without gambling disorder. Studies have turned to modified classification schemes, e.g., comparing gamblers with any symptoms of gambling disorder against those without any symptoms, or grouping moderate-risk and problem gamblers together and then comparing low and high-risk gambling groups. Both of these strategies are conducted to garner sufficient power for analyses, but go against the classification scheme outlined by the Canadian Problem Gambling Index. The author felt it was important to use the classification scheme outlined by the CPGI (Ferris & Wynne, 2001) and not arbitrarily use a classification to fit the data. In this respect, the analyses therein have stayed true to theory but as a by-product were limited in terms of power to assess group differences for those above the clinical threshold (disordered or problem gambling). To overcome this limitation, the author used the continuous measure of problem gambling severity in the multivariate analyses (after assessing for significant relationships in preliminary analyses). In addition to addressing the limitation regarding small sample sizes of clinical levels of gambling behavior, utilizing the continuous measure also stayed true to an understanding of gambling behavior as a spectrum and not a categorical disorder (Boudreau, LaBrie, & Shaffer, 2009).

Second, because this was a foundational study, the experimental conditions and methodology were experimental and could have limited the findings. Both the objective goal setting and loss/win conditions had yet to be employed in other gambling projects and may have been improved with more piloting, alternative language for the objective goal setting condition, or by using alternative casino script parameters (e.g., changing bet sizes, modifying the size of losses and wins) in the loss/win condition. In addition, the questions regarding subjective goals were written for this study and were, therefore, not validated or replicated in other studies. The subjective goal setting scale was developed specifically for this project and therefore had not undergone extensive analysis for reliability and validity of the items or factor structure prior to being used in this study. However, the scale was developed using a psychometrically established scale (Achievement Goals Questionnaire, Elliott & Church, 1997) as a theoretical backdrop. Exploratory factor analysis and item analysis were conducted for the subjective goal setting scale. Three of the nine original items were dropped, resulting in a six-item scale that demonstrated adequate reliability. Future research should examine the subjective goal setting scale in a larger sample of participants, compare against other related constructs to establish convergent and discriminant validity, and analyze alongside measures of gambling pathology to strengthen the scale's predictive validity.

Finally, the study used a convenience sample of university students in a simulated casino condition rather than a diverse group of gamblers in a casino, thereby limiting the generalizability and representativeness of the findings. This study recruited university-aged psychology students as participants, a cohort which may be different than actual casino players (Gainsbury, Russell, & Blaszczynski, 2012). However, this cohort is also one of the more vulnerable age-based cohorts in terms of gambling disorder prevalence (Welte et. al, 2001). In addition, gambling pathology appears to be transient in nature (LaBrie et al., 2008), and comparisons of associated psychological processes between recreational and disordered gamblers suggest that the motivations and psychological processes at play in gambling behavior may be more similar than different regardless of the level of gambling pathology (Boudreau et al., 2009). As a result, this study provided

valuable information about the psychological process of goal setting among a cohort that has demonstrated inflated prevalence rates of gambling disorder. Future research should investigate the role of goal setting among disordered gamblers, among different agegroup cohorts, and among different types of gamblers (strategic vs. non-strategic forms of play).

Directions for Future Research & Conclusions

This dissertation highlighted the role of goal setting on chasing behavior. In this respect, this study identified a new etiological factor associated with chasing behavior, a proxy of gambling-related harm. These findings demonstrated significant differences by gender, and pointed to future areas of research to provide more detail on the role of goal setting in the gambling domain. This project controlled for wins and losses, and important demographic and dispositional factors associated in prior research with gambling-related harm. Results of the multivariate analyses demonstrated that subjective goals are an important factor to consider in chasing behavior. In addition, these findings highlight a previously overlooked factor that may be missing in responsible gambling practices and initiatives. The further explication of goal setting in responsible gambling messages may prove particularly helpful for many gamblers who have thus far demonstrated a mixed response to responsible gambling messages focused on limitsetting and other strategies highlighting risk-aversion. Future research should compare responsible gambling messages that encourage shifting one's goal in a more responsible fashion against encouraging players to create a limit for themselves. This comparison should be made across levels of problem gambling severity, by gender, and by age groups to assess for response to type of responsible gambling message best indicated for each respective cohort.

In summary, this dissertation conducted a rigorous examination of two forms of goal setting and their relationship with chasing behavior while controlling for other important predictors of gambling pathology. The findings build on prior research, highlighting the importance of problem gambling severity and gender differences in gambling, while contributing new findings about the role of goal setting in the gambling environment.

References

- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: APA.
- American Psychiatric Association (APA) (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association (APA) (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.
- American Psychiatric Association (2013, June 6). *Substance-Related and Addictive Disorders*. Retrieved from <u>http://www.psychiatry.org/dsm5</u>
- Ali, M.M. (1977). Probability and utility estimates for racetrack bettors. *Journal of Political Economy*, *85*, 803-815.
- Ariely, D. & Lowenstein, G. (2006). The heat of the moment: The effect of sexual arousal on sexual decision making. *Journal of Behavioral Decision Making*, 19, 87-98.
- Arkes, H.R., Joyner, C.A., Pezzo, M.V., Gradwohl-Nash, J., Siegel-Jacobs, K., & Stone, E. The psychology of windfall gains. *Organizational Behavior and Human Decision Processes*, 59, 331-347.
- Atkinson, J., Sharp, C., Schmitz, J., & Yaroslavsky, I. (2012). Behavioral activation and inhibition, negative affect, and gambling severity in a sample of young adult college students. *Journal of Gambling Studies, 28*, 437-449.
- Austin, J.T., & Vancouver, J.B. (1996). Goal constructs in psychology. *Psychological Bulletin*, 120, 338-375.
- Baumann S. B., Neff C., Fetzick S., Stangl G., Basler L., Vereneck R., & Schneider W. (2003). A virtual reality system for neurobehavioural and functional MRI studies. *Cyberpsychology & Behaviour*, 6, 259–266.
- Bernhard, B.J., Lucas, A.F., & Dongsuk, J. (2006). *Responsible gaming device research report*. Las Vagas: International Gaming Institute, University of Nevada.
- Blalock, G., Just, D.R., & Simon, D.H. (2007). Hitting the jackpot or hitting the skids: Entertainment, poverty, and the demand for state lotteries. *American Journal of Economics and Sociology, 66*, 545-570.
- Blaszczynski, A., Collins, P., Fong, D., Ladouceur, R., Nower, L., Shaffer, H.J., Tavares, H., & Venisse, J.L. (2011). Responsible gambling: General principles and minimal requirements. *Journal of Gambling Studies*, 27, 565-573.
- Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, *97*, 487-500.
- Blaszczynski, A., Sharpe, L., Walker, M., Shannon, K., & Coughlan, M.-J. (2005). Structural characteristics of electronic gaming machines and satisfaction of play among recreational and problem gamblers. *International Gambling Studies*, 5, 187–198.
- Boudreau, A., LaBrie, R., & Shaffer, H.J. (2009). Towards DSM-V: 'Shadow Syndrome' symptom patterns among pathological gamblers. *Addiction Research and Theory*, *17*, 406-419.
- Bracht, G.H., & Glass, G.V. (1968). The external validity of experiments. *American Educational Research Journal*, *5*, 437-474.
- Breen, R.B., & Zuckerman, M. (1999). Chasing in gambling behavior: Personality and

cognitive determinants. Personality and Individual Differences, 27, 1097-1111.

- Callan, M.J., Shead, N.W., & Olson, J.M. (2011). Personal relative deprivation, delay discounting, and gambling. *Journal of Personality and Social Psychology*, 101, 955-973.
- Campbell, D.T. & Stanley, J.C. (1966). *Experimental and quasi-experimental designs for research*. Boston: Houghton Mifflin Company.
- Campbell-Meiklejohn, D.K., Woolrich, M.W., Passingham, R.E., & Rogers, R.D. (2008). Knowing when to stop: The brain mechanisms of chasing losses. *Biological Psychiatry*, 63, 293-300.
- Carver, C.S. & White, T.L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, *67*, 319-333.
- Cloutier, M., Ladouceur, R., & Sevigny, S. (2006). Responsible gambling tools: Pop-up messages and pauses on video lottery terminals. *The Journal of Psychology: 140*, 434-438.
- Coats, E.J., Janoff-Bulman, R., & Alpert, N. (1996). Approach versus avoidance goals: Differences in self-evaluation and well-being. *Personality and Social Psychology Bulletin, 22*, 1057-1067.
- Cote, D., Caron, A., Aubert, J., Desrochers, V., & Ladouceur, R. (2003). Near wins prolong gambling on a video lottery terminal. *Journal of Gambling Studies*, 19, 433-438.
- Crowe, E. & Higgins, T.E. (1997). Regulatory focus and strategic inclinations: promotion and prevention in decision-making. *Organizational Behavior and Human Decision Processes*, 69, 117-132.
- Custer, R.L. (1984). Profile of the pathological gambler. *Journal of Clinical Psychiatry*, 45, 35-38.
- Darbyshire, P., Oster, C., & Carrig, H. (2001). The experience of pervasive loss: Children and young people living in a family where parental gambling is a problem. *Journal of Gambling Studies*, *17*, 23-45.
- Derevensky, J.L., Gupta, R., & Winters, K. (2003). Prevalence rates of youth gambling: Are the current rates inflated? *Journal of Gambling Studies*, 19, 405-425.
- Dixon, M.J., Harrigan, K.A., Sandhu, R., Collins, K., & Fugelsang, J.A. (2010). Losses disguised as wins in modern multi-line video slot machines. *Addiction*, 105, 1819-1824.
- Dowling, N., Smith, D. & Thomas, T. (2005). Electronic gaming machines: Are they the 'crack-cocaine' of gambling? *Addiction*, *100*, 33-45.
- Eadington, W.R. (1999). The economics of casino gambling. *Journal of Economic Perspectives*, 13, 173-192.
- El-Guebaly, N., Mudry, T., Zohar, J., Tavares, H., & Potenza, M.N. (2012). Compulsive features in behavioural addictions: The case of pathological gambling. *Addiction*, *107*, 1726-1734.
- Elliot, A.J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, 34, 169-189.
- Elliot, A.J., & Church, M.A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, *72*, 218-232.

- Elliott, A.J., McGregor, H.A., & Gable, S. (1999). Achievement goals, study strategies, and exam performance: A meditational analysis. *Journal of Educational Psychology*, *91*, 549-563.
- Elliot A.J. & Thrash, T.M. (2002). Approach–avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology*, 82, 804-818.
- Ferris, J., & Wynne, H. (2001). The Canadian Problem Gambling Index: Final Report. Ottawa, Ontario: Canadian Centre on Substance Abuse.
- Floyd, K., Whelan, J.P., & Meyers, A.W. (2006). Use of warning messages to modify gambling beliefs and behavior in a laboratory investigation. *Psychology of Addictive Behaviors*, 20, 69-74.
- Fowles, D.C. (1987). Application of a behavioral theory of motivation to the concepts of anxiety and impulsivity. *Journal of Research in Personality*, *21*, 417-435.
- Fox, C.R., & Tversky, A. (1995). Ambiguity aversion and comparative ignorance. *Quarterly Journal of Economics, 110*, 585-603.
- Gainsbury, S., & Wood, R. (2011). Internet gambling policy in critical comparative perspective: The effectiveness of existing regulatory frameworks. *International Gambling Studies*, *11*, 309-323.
- Gainsbury, S. M., Russell, A., & Blaszczynski, A. (2012). Are psychology university student gamblers representative of non-university students and general gamblers? A comparative analysis. Journal of Gambling Studies. DOI: http://link.springer.com/content/pdf/10.1007%2Fs10899-012-9334-9.pdf
- Gerstein, D.R., Volberg, R.A., Toce, M.T., Harwood, H., Johnson, R.A., Buie, T., et al. (1999). *Gambling Impact and Behavior Study: Report to the National Gambling Impact Study Commission*. Chicago: National Opinion Research Center.
- Gray, J.A. (1981). A critique of Eysenck's theory of personality, In H.J. Eysenck (Ed.) *A* model for personality (pp. 246–276).
- Griffiths, M., Wardle, H., Orford, J., Sproston, K., & Erens, B. (2009).
 Sociodemographic correlates of Internet gambling: Findings from the 2007
 British Gambling Prevalence Survey. *Cyberpsychology & Behavior, 12*, 199-202.
- Griffiths, M.D., Wood, R.T.A., & Parke, J. (2009). Social responsibility tools in online gambling: A survey of attitudes and behavior among Internet gamblers. *CyberPsychology & Behavior*, 12, 413-421.
- Grinols, E.L., & Mustard, D.B. (2006). Casinos, crime, and community costs. *Review of Economics and Statistics*, 88, 28-45.
- Haefeli, J., Lischer, S., & Schwarz, J. (2011). Early detection items and responsible gambling features for online gambling. *International Gambling Studies*, *11*, 273-288.
- Hardoon, K., & Derevensky, J.L. (2002). Child and adolescent gambling behavior: Our current knowledge. *Clinical Child Psychology and Psychiatry*, 7, 263-281.
- Harrigan, K.A. & Dixon, M. (2010). Government sanctioned "tight" and "loose" slot machines: How having multiple versions of the same slot machine game may impact problem gambling. *Journal of Gambling Studies*, 26, 159-174.
- Heath, C., Larrick, R.P., & Wu, G. (1999). Goals as reference points. *Cognitive Psychology*, *38*, 79-109.
- Herman, W.E. (1987). Test anxiety: Emotionality, worry, and fear of failure.

Dissertation Abstracts International, 48(3-A).

- Herman, W.E. (1990). Fear of failure as a distinctive personality trait measure of test anxiety. *Journal of Research and Development in Education*, 23, 180-185.
- Hodgins, D.C., & El-Guebaly, N. (2000). Natural and treatment-assisted recovery from gambling problems: A comparison of resolved and active gamblers. *Addiction*, 95, 777-789.
- Hodgins, D. C., Shead, N. W., & Makarchuk, K. (2007). Relationship satisfaction and psychological distress among concerned significant others of pathological gamblers. *Journal of Nervous & Mental Disease*, 195, 65-71.
- Holt, C.A., & Laury, S.K. (2002). Risk aversion and incentive effects. *The American Economic Review*, 92, 1644-1655.
- Jackson, D.N. (1974). *Manual for the Personality Research Form*. Port Huron, MI: Research Psychologists Press.
- Jacobs, D.F., Marston, A.R., Singer, R.D., Widaman, K., Little, T., & Veizades, J. (1989). Children of problem gamblers. *Journal of Gambling Studies*, *5*, 261-268.
- Jonson, E.P., Lindorff, M., & McGuire, L. (2012). Paternalism and the pokies: Unjustified state interference or justifiable intervention? *Journal of Business Ethics*, 110, 259-268.
- Kahneman, D., Knetsch, J.L., & Thaler, R.H. (1990). Experimental tests of the endowment effect and the coarse theorem. *The Journal of Political Economy*, *98*, 1325-1348.
- Kahneman, D., Knetsch, J.L., & Thaler, R.H. (1991). The endowment effect, loss aversion, and status quo bias. *The Journal of Economic Perspectives*, *5*, 193-206.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47, 263–291.
- Kallick, M., Suits, D., Dielman, T., & Hybels, J. (1976). A survey of American gambling attitudes and behavior. (USGPO Stock No. 052–003–00254). Washington, DC: U.S. Government Printing Office.
- Kimball, M.S. (1993). Standard risk-aversion. Econometrica, 61, 589-611.
- Korn, D. A. & Shaffer H. J. (1999). Gambling and the health of the public: Adopting a public health perspective. *Journal of Gambling Studies*, 15, 289–365.
- Kreussel, L., Hewig, J., Kretschmer, N., Hecht, H., Coles, M.G.H., & Miltner, W.H.R. (2013). How bad was it? Differences in the time course of sensitivity to the magnitude of loss in problem gamblers and controls. *Behavioural Brain Research*, 247, 140-145.
- LaBrie, R.A., Kaplan, S.A., LaPlante, D.A., Nelson, S.E., & Shaffer, H.J. (2008). Inside the virtual casino: A prospective longitudinal study of actual Internet casino gambling. *European Journal of Public Health*, *18*, 410-416.
- Ladouceur, R. (2005). Controlled gambling for pathological gamblers. *Journal of Gambling Studies*, 21, 49-59.
- Ladouceur, R., Blaszczynski, A., & LaLande, D.R. (2012). Pre-commitment in gambling: A review of the empirical evidence. *International Gambling Studies*, *12*, 215-230.
- Ladouceur, R., Boisvert, J., Pepin, M., & Loranger, M. (1994). Social cost of pathological gambling. *Journal of Gambling Studies*, *10*, 399-409.
- Ladouceur, R., & Sevigny, S. (2005). Structural characteristics of video lotteries: Effects of a stopping device on illusion of control and gambling persistence. *Journal of*

Gambling Studies, 21, 117-131.

- LaPlante, D.A., Nelson, S.E., LaBrie, R.A., & Shaffer, H.J. (2011). Disordered gambling, type of gambling, and gambling involvement in the British Gambling Prevalence Survey 2007. European Journal of Public Health, 21, 532-537.
- LaPlante, D.A., Nelson, S.E., LaBrie, R.A., & Shaffer, H.J. (2008). Stability and progression of disordered gambling: Lessons from longitudinal studies. *Canadian Journal of Psychiatry-Revue*, 53, 52-60.
- LaPorte, R.E., & Nath, R. (1976). Role of performance goals in prose learning. *Journal of Educational Psychology*, 68, 260-264.
- Larrick, R.P., Heath, C., & Wu, G. (2009). Goal-induced risk taking in negotiation and decision making. *Social Cognition*, *27*, 342-364.
- Ledgerwood, D.M., & Petry, N.M. (2004). Gambling and suicidality in treatment-seeking pathological gamblers. *Journal of Nervous and Mental Disease, 192*, 711-714.
- Lee, H.P., Chae, P.K., Lee, H.S., & Kim, Y.K. (2007). The five-factor gambling motivation model. *Psychiatry Research*, 150, 21-32.
- Lesieur, H. (1979). The compulsive gambler's spiral of options and involvement. *Psychiatry: Journal for the Study of Interpersonal Processes*, *42*, 79-87.
- Lesieur, H., & Rothschild, J. (1989). Children of Gamblers Anonymous members. Journal of Gambling Studies, 5, 269-281.
- Levin, I.P., Schneider, S.L., & Gaeth, G.J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes*, *76*, 149-188.
- Lister, J.J., Wohl, M.J.A., & Davis, C.G. (2013, April). The dark side of authenticity: Feeling "real" while gambling interacts with enhancement motives to predict problematic gambling behaviour. Poster session presented at the Alberta Gambling Research Institute's 12th Annual Conference, Banff, AB.
- Loba, P., Stewart, S.H., Klein, R.M., & Blackburn, J.R. (2001). Manipulations of the features of standard video lottery terminals (VLT) games: Effects in pathological and non-pathological gamblers. *Journal of Gambling Studies*, *17*, 297-320.
- Locke, E.A., & Latham, G.P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice Hall International.
- Locke, E.A., & Latham, G.P. (1991). Self-regulation through goal setting. *Organizational Behavior and Human Decision Processes, 50*, 212-247.
- Locke, E.A., & Latham, G.P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, 57, 705–717.
- Lowenstein, G. (2005). Hot-cold empathy gaps and medical decision making. *Health Psychology*, *24*, S49-S56.
- Lowenstein, G. (1996). Out of control: visceral influences on behavior. *Organizational Behavior and Human Decision Processes, 65, 272-292.*
- Loewenstein, G.F., Thompson, L., & Bazerman, M.H. (1989). Social utility and decision making in interpersonal contexts. *Journal of Personality and Social Psychology*, 57, 426-441.
- McGlothlin, W.L. (1956). Stability of choices among uncertain alternatives. *American Journal of Psychology*, 69, 604-615.
- Meyer, G., & Stadler, M. A. (1999). Criminal behavior associated with pathological gambling. *Journal of Gambling Studies*, 15, 29-43.

- Mishra, S., & Fiddick, L. (2012). Beyond gains and losses: The effect of need on risky choice in framed decisions. *Journal of Personality and Social Psychology*, *102*, 1136-1147.
- Monaghan, S., & Blaszczynski, A. (2010). Impact of mode of display and message content of responsible gambling signs for electronic gaming machines on regular gamblers. *Journal of Gambling Studies, 26*, 67-88.
- Monaghan, S., Blaszczynski, A., & Nower, L. (2009a). Consequences of winning: The role of gambling outcomes in the development of irrational beliefs. *Behavioral and Cognitive Psychotherapy*, *37*, 49-59.
- Monaghan, S., Blaszczynski, A., & Nower, L. (2009b). Do warning signs on electronic gaming machines influence cognitions? *Psychological Reports*, *105*, 173-187.
- Moran, M. (2013). Gambling disorder to be included in addictions chapter. *Psychiatric News*, 48, 5.
- National Centre for Social Research. *British gambling prevalence survey 2007*. Colchester, Essex: UK Data Archive, 2008.
- National Research Council. (1999). *Pathological gambling: A critical review*. Washington, DC: National Academy Press.
- National Opinion Research Center (NORC). (1999). *Gambling impact and behavior study*. Final Report to the National Gambling Impact Study Commission. Chicago, NORC.
- Neighbors, C., Lostutter, T.W., Cronce, J.M. & Larimer, M.E. (2002). Exploring college student gambling motivation. *Journal of Gambling Studies*, *18*, 361-370.
- Nichols, M.W., Stitt, B.G., & Giacopassi, D. (2000). Casino gambling and bankruptcy in new United States casino jurisdictions. *Journal of Socio-Economics*, 29, 247-261.
- Nower, L. (2003). Pathological gamblers in the workplace: A primer for employees. *Employee Assistance Quarterly, 18*, 55-72.
- Nower, L. & Blaszczynski, A. (2006). Characteristics and gender differences among selfexcluded casino problem gamblers: Missouri data. *Journal of Gambling Studies*, 22, 81-99.
- Nower, L. & Blaszczynski, A. (2010). Gambling motivations, money-limiting strategies, and precommitment preferences of problem versus non-problem gamblers. *Journal of Gambling Studies, 26*, 361-372.
- Nower, L. & Blaszczynski, A. (2008). Recovery in pathological gambling: An imprecise concept. *Substance Use & Misuse, 43*, 1844-1864.
- Nower, L., Derevensky, J.L., & Gupta, R. (2004). The relationship of impulsivity, sensation seeking, coping, and substance use in youth gamblers. *Psychology of Addictive Behaviors, 18*, 49-55.
- O'Connor, J., & Dickerson, M. (2003). Definition and measurement of chasing in offcourse betting and gaming machine play. *Journal of Gambling Studies*, *19*, 359-386.
- O'Connor, R.M., Stewart, S.H., & Watt, M.C. (2009). Distinguishing BAS risk for university students' drinking, smoking, and gambling behaviors. *Personality and Individual Differences*, 46, 514-519.
- Odlaug, B.L., Marsh, P.J., Won Kim, S., & Grant, J.E. (2011). Strategic and nonstrategic gambling: Characteristics of pathological gamblers based on gambling preference. *Annals of Clinical Psychiatry*, 23, 105-112.

- Olason, D.T., Kristjansdottir, H., Einarsdottir, H., Haraldsson, H., Bjarnason, G., & Derevensky, J.L. (2011). Internet gambling and problem gambling among 13 to 18 year old adolescents in Iceland. *International Journal of Mental Health and Addiction*, *9*, 257-263.
- Olason, D. T., Sigurdardottir, K. J., & Smari, J. (2006). Prevalence estimates of gambling participation and problem gambling among 16–18 year old students in Iceland: A comparison of the SOGS-RA and DSM-IV-MR-J. *Journal of Gambling Studies*, 22, 23–39.
- Olason, D. T., Skarphedinsson, G. A., Jonsdottir, J. E., Mikaelsson, M., & Gretarsson, S. J. (2006). Prevalence estimates of gambling and problem gambling among 13–15year-old adolescents in Reykjavík: an examination of correlates of problem gambling and different accessibility to electronic gambling machines in Iceland. *Journal of Gambling Issues, 18*, 39–56.
- Omnifacts Bristol Research. (2005). Nova Scotia player card research project: Stage I research report. Retrieved from

http://nsgc.ca/research/responsible_gaming_device_research_project/

Omnifacts Bristol Research. (2007). Nova Scotia player card research project: Stage III research report. Retrieved from

http://nsgc.ca/research/responsible_gaming_device_research_project/

- Orford, J. (2003). The fascination of psychometrics: Commentary on Gerstein et al. (2003). *Addiction, 12*, 1675-1677.
- Peller, A.J., LaPlante, D.A., & Shaffer, H.J. (2008). Parameters for safer gambling behavior: Examining the empirical research. *Journal of Gambling Studies, 24*, 519-534.
- Pervin, L.A. (1989). Goal concepts in personality and social psychology: A historical perspective. In L.A. Pervin (Ed.), *Goal concepts in personality and social psychology* (pp. 1-17). Hillsdale, NJ: Erlbaum.
- Petry, N.M. & Kiluk, B.D. (2002). Suicidal ideation and suicide attempts in treatmentseeking pathological gamblers. *Journal of Nervous and Mental Disease*, 190, 462-469.
- Petry, N.M. (2001a). Pathological gamblers, with and without substance use disorders, discount delayed rewards at high rates. *Journal of Abnormal Psychology, 110*, 482-487.
- Petry, N.M. (2001b). Substance abuse, pathological gambling, and impulsiveness. *Drug* and Alcohol Dependence, 63, 29-38.
- Petry, N.M. (2003). Moving beyond a dichotomous classification for gambling disorders. *Addiction*, *98*, 1673-1674.
- Petry, N. M., Stinson, F. S., & Grant, B. F. (2005). Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: Results from the national epidemiologic survey on alcohol and related conditions. *Journal of Clinical Psychiatry*, 66, 564-574.
- Potenza, M.N. (2008). The neurobiology of pathological gambling and drug addiction: An overview and new findings. *Philosophical Society of the Royal Society B* – *Biological Sciences, 363,* 3181-3189.
- Potenza, M.N. (2013, May). Unveiling the DSM-V Criteria for Pathological Gambling.

Keynote address at the 15th International Conference on Gambling and Risk Taking, Las Vegas, NV.

- Potenza, M.N., Steinberg, M.A., McLaughlin, M.D., Wu, R., Rousanville, B.J., & O'Malley, S.S. (2000). Illegal behaviors in problem gambling: Analysis of data from a gambling helpline. *Journal of the American Academy of Psychiatry and the Law, 28*, 389-403.
- Potenza, M. N., Fiellin, D. A., Heninger, G. R., Rounsaville, B. J., & Mazure, C. M. (2002). Gambling: An addictive behavior with health and primary care implications. *Journal of General Internal Medicine*, 17, 721-732.
- Reuter, J., Raedler, T., Rose, M., Hand, I., Glascher, J. & Buchel, C. (2005). Pathological gambling is linked to reduced activation of the mesolimbic reward system. *Nature Neuroscience*, *8*, 147-148.
- Ross, L., Lepper, M.R., & Hubbard, M. (1975). Perseverance in self-perception and social perception: Biased attributional processes in the debriefing paradigm. *Journal of Personality and Social Psychology*, 32, 880-892.

Schottler Consulting. (2009). *Major findings of a trial of a card-based gaming product at the Redcliffe RSL*. Retrieved from http://www.olgr.qld.gov.au/resources/responsibleGamblingDocuments/SchottlerC onsultingReportintoCBGtrialRedcliffeRSLExemptMaterialRemoved.pdf

Schottler Consulting. (2010). Major findings and implications: Player tracking and precommitment trial: A program and outcome evaluation of the PlaySmart precommitment system. Retrieved from www.treasury.sa.gov.au/public/download.jsp?id1=3188

- Shaffer, H.J., & Korn, D.A. (2002). Gambling and related mental disorders: A public health analysis. *Annual Review of Public Health, 23,* 171-212.
- Shaffer, H. J., Hall, M. N. (2001). Updating and refining prevalence estimates of disordered gambling behaviour in the United States and Canada. *Canadian Journal of Public Health*, *92*, 168-172.

Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (1997). Estimating the prevalence of disordered gambling behavior in the United States and Canada: A meta-analysis. Boston: Harvard Medical School, Division on Addictions.

Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (1999). Estimating the prevalence of disordered gambling behavior in the United States and Canada: A research synthesis. *American Journal of Public Health*, 89, 1369-1376.

Shaffer, H.J., & Martin, R. (2011). Disordered gambling: Etiology, trajectory, and clinical considerations. *Annual Review of Clinical Psychology*, 7, 483-510.

- Sharpe, L. (2002). A reformulated cognitive-behavioral model of problem gambling: A biopsychosocial perspective. *Clinical Psychology Review*, 22, 1–25.
- Sharpe, L., Walker, M., Coughlan, M.-J., Enersen, K., & Blaszczynski, A. (2005). Structural changes to electronic gaming machines as effective harm minimization strategies for nonproblem and problem gamblers. *Journal of Gambling Studies*, 21, 503–520.
- Slutske, W.S. (2006). Natural recovery and treatment-seeking in pathological gambling: Results of two U.S. national surveys. *American Journal of Psychiatry*, *163*, 297-302.
- Stewart, M. & Wohl, M. J. A. (2013). Pop-up messages, dissociation, and craving: How

monetary limit reminders facilitate adherence in a session of slot machine gambling. *Psychology of Addictive Behaviors, 27*, 268-273.

- Stewart, S.H., & Zack, M. (2008). Development and psychometric evaluation of a threedimensional Gambling Motives Questionnaire. *Addiction*, 103, 1110-1117.
- Stoeber, J., Uphill, M.A., & Hotham, S. (2009). Predicting race performance in triathlon: The role of perfectionism, achievement goals, and personal goal setting. *Journal* of Sport & Exercise Psychology, 31, 211-245.
- Suurvali, H., Hodgins, D., Toneatto, T., & Cunningham, J. (2008). Treatment seeking among Ontario problem gamblers: Results of a population survey. *Psychiatric Services*, 59, 1343-1346.
- Sztainert, T. Wohl, M.J.A., & Abizad, A. (2013, May). Starving to Gamble: Hunger and Gambling-related Craving Interact to Heighten Persistent Play among Problem Gamblers. Paper presented at the 15th International Conference on Gambling and Risk Taking, Las Vegas, NV.
- Sztainert, T. Wohl, M.J.A., McManus, J.F., & Stead, J.H. (2013). On being attracted to the possibility of a win: Reward sensitivity (via Gambling Motives) undermines treatment seeking among pathological gamblers. Journal of Gambling Studies. DOI: <u>http://link.springer.com/article/10.1007/s10899-013-9394-5</u>.
- Tavares, H., Martins, S.S., Lobo, D.S.S., Silveira, C.M., Gentil, V., & Hodgins, D.C. (2003). Factors at play in faster progression for female pathological gamblers: An exploratory analysis. *Journal of Clinical Psychiatry*, 64, 433-438.
- Thaler, R.H., & Johnson, E.J. (1990). Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. *Management Science*, *36*, 643-660.
- Toce-Gerstein, M., Gerstein, D.R., & Volberg, R.A. (2003). A hierarchy of gambling disorders in the community. *Addiction*, *98*, 1661-1672.
- Toneatto, T. (1999). Cognitive psychopathology of problem gambling. *Substance Use & Misuse, 34, 1593-1604.*
- Toneatto, T., Cunningham, J., Hodgins, D., Adams, M., Turner, N., & Koski-Jannes, A. (2008). Recovery from problem gambling without formal treatment. *Addiction Research & Theory*, 16, 111-120.
- Torrubia, R., Avila, C., Molto, J., & Caseras, X. (2001). The Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) as a measure of Gray's anxiety and impulsivity dimensions. *Personality and Individual Differences*, *31*, 837-862.
- Turner, N.E., Zangeneh, M., & Littman-Sharp, N. (2006). The experience of gambling and its role in problem gambling. *International Gambling Studies*, *6*, 237-266.
- Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A referencedependent model. *Quarterly Journal of Economics*, 106, 1039–1061.
- Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: cumulative representations of uncertainty. *Journal of Risk and Uncertainty*, *5*, 297-323.
- Tversky, A., & Fox, C.R. (1995). Weighing risk and uncertainty. *Psychological Review*, *102*, 269-283.
- Volberg, R.A. (1994). The prevalence and demographics of pathological gamblers: Implications for public health. *American Journal of Public Health*, 84, 237-241.
- Volberg, R.A., & Abbott, M.W. (1997). Gambling and problem gambling among indigenous peoples. *Substance Use & Misuse, 32*, 1525-1538.

- Walker, D.M., & Jackson, J.D. (2007). Do casinos cause economic growth? American Journal of Economics and Sociology, 66, 593-607.
- Walker, D.M. (2007). Problems in quantifying social costs and benefits of gambling. *American Journal of Economics and Sociology, 66*, 609-645.
- Weber, B.J., & Chapman, G.B. (2005). Playing for peanuts: Why is risk seeking more common for low-stakes gambles? Organizational Behavior and Human Decision Processes, 97, 31-46.
- Weinstock, J., Ledgerwood, D.M., & Petry, N.M. (2007). Association between posttreatment gambling behavior and harm in pathological gamblers. *Psychology* of Addictive Behaviors, 21, 185-193.
- Welte, J., Barnes, G.M., Tidwell, M.C., & Parker, J. (2011). Gambling and problem gambling across the lifespan. *Journal of Gambling Studies*, *27*, 49-61.
- Welte, J.W., Barnes, G.M., Tidwell, M.C.O., & Hoffman, J.H. (2009). The association of form of gambling with problem gambling among youth. *Psychology of Addictive Behaviors*, 23, 105-112.
- Welte, J.W., Barnes, G.M., Tidwell, M.C.O., & Hoffman, J.H. (2008). The prevalence of problem gambling among US adolescents and young adults: Results from a national study. *Journal of Gambling Studies*, 24, 119-133.
- Welte, J., Barnes, G.M., Wieczorek, W., Tidwell, M.C., & Parker, J. (2001). Alcohol and gambling pathology among U.S. adults: Prevalence, demographic patterns, and comorbidity. *Journal of Studies on Alcohol*, 62, 706-712.
- Welte, J., Barnes, G.M., Wieczorek, W., Tidwell, M.C., & Parker, J. (2002). Gambling participation in the U.S.: Results from a national survey. *Journal of Gambling Studies*, *18*, 313-337.
- Wiley, J.A., & Walker, D.M. (2011). Casino revenues and retail property values: The Detroit case. *The Journal of Real Estate Finance and Economics*, 42, 99-114.
- Williams, R., & Hann, R. (2012, April). *Quinte Longitudinal Study (QLS)*. Paper presented at the Alberta Gambling Research Institute's 11th Annual Conference, Banff, AB.
- Wohl, M. J. A., & Enzle, M. E. (2003). The effects of near wins and losses on selfperceived personal luck and subsequent gambling behavior. *Journal of Experimental Social Psychology*, 39, 184-191.
- Wohl, M.J.A., Christie, K.L., Matheson, K., & Anisman, H. (2010). Animation-based education as a gambling prevention tool: Correcting erroneous cognitions and reducing the frequency of exceeding limits among slots players. *Journal of Gambling Studies*, 26, 469-486.
- Wohl, M.J.A., Lyon, M., Donnelly, C.L., Young, M.M., Matheson, K., & Anisman, H. (2008). Episodic cessation of gambling: A numerically aided phenomenological assessment of why gamblers stop playing in a given session. *International Gambling Studies*, 8, 249–263.
- Wolters, C.A. (2004). Advancing achievement goal theory: Using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology*, *96*, 236-250.
- Young, M.M., Wohl, M.J.A., Matheson, K., Baumann, S., & Anisman, H. (2008). The desire to gamble: The influence of outcomes on the priming effects of a gambling episode. *Journal of Gambling Studies*, *24*, 275–293.

Appendix A: Announcement for Recruitment (SONA System)

Study Name: Decision Making During Virtual Gambling

Abstract: Participants are asked to complete a variety of questionnaires and then participate in a gambling task.

Description: The purpose of this study is to assess gambling behaviour. We will be asking you to wear virtual reality headgear which creates a realistic and interactive casino atmosphere (sights and sounds). The user has the capability of interacting with the virtual casino in a gambling situation, and you will have the opportunity to do so. You will also be asked to complete a series of questionnaires about your background (e.g., age, sex, ethnicity), and gambling (e.g., propensity to gamble and attitudes toward gambling).

Your participation as well as your responses will be strictly confidential. Only researchers associated with the research project will know you participated in the study and no one will know how you responded to the questions asked.

Eligibility Requirements:

Have gambled in your lifetime (e.g. lotto tickets, slots, cards)Did not participate in ethics 11-188 entitled, "Gambling Behaviour among Slot Players"Did not participate in ethics 11-003 "Gambling Behaviours, Attitudes and Ghrelin"

Duration: 60 minutes

Compensation: You will receive \$20 to play in the virtual casino with the opportunity to win or lose money. The money you finish the study with will be yours to take home following completion of the project.

Researchers: Jamey Lister Office: SSRB 306 Email: jamey_lister@carleton.ca

This study has received clearance by the Carleton University Psychology Research Ethics Board (Reference #11-128).
Appendix B: Informed Consent

The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent has to provide sufficient information such that you have the opportunity to determine whether you wish to participate in the study.

Study Title: Decision Making During Virtual Gambling

Study Personnel

Dr. Michael Wohl (Principal Investigator/Faculty Sponsor, 520-2600, ext. 2908)Dr. Lia Nower (Principal Investigator, 732-932-7520, ext. 114)Jamey Lister (Co-Investigator/Project Coordinator, 520-2600, ext. 6312)

Other Research Personnel

Travis Sztainert (520-2600, ext. 6312) Jessica Palladina (520-2600, ext. 2683) Justin McManus (520-2600, ext. 6312)

If you have any ethical concerns about this study please contact Dr. Monique Sénéchal (Chair of the Carleton University Ethics Committee for Psychological Research, 520-2600, ext. 1155; monique_senechal@carleton.ca) or Anne Bowker (Chair of the Department of Psychology at Carleton University, 520-2600, ext. 8218; anne_bowker@carleton.ca). This study has been approved by the Carleton University Ethics Committee for Psychological Research (11-128). Please use this number if you need to contact the Chair of the Department or Chair of Ethics Committee concerning this study.

Purpose and Task Requirements: The purpose of this study is to assess gambling behaviour. We will be asking you to wear virtual reality headgear which creates a realistic and interactive casino atmosphere (sights and sounds). The user has the capability of interacting with the virtual casino in a gambling situation, and you will have the opportunity to do so. You will also be asked to complete a series of questionnaires about your background (e.g., age, sex, ethnicity), and gambling (e.g., propensity to gamble and attitudes toward gambling). The study will take about 60 minutes to complete; you will receive \$20 to play in the virtual casino with the opportunity to win or lose money. The money you finish the study with will be yours to take home following completion of the project.

Potential Risk and Discomfort: There are no physical risks in this study. Some individuals may experience discomfort when asked to respond to personal, sensitive questions. In addition, some individuals may experience discomfort or nausea when interacting with the virtual reality console (also known as cybersickness). If you do feel nauseous when using the virtual reality console, please take a break (i.e., close your eyes). If the nausea continues, please tell the experimenter and he or she will terminate the study.

You will fill out surveys, some of which contain questions about negative emotions). Some of the study materials (i.e. certain questions) contain or may elicit negative emotions. If at any time in the study you no longer wish to participate, please make the experimenter aware of your wishes. Finally, although potential risks have attempted to be minimized, the present study may still have an impact on your gambling behaviour in the future. Contact information will be provided at the end of the study should you wish to contact your local health and counseling services.

Anonymity/Confidentiality: All the information collected in this study will be kept confidential. We take special precautions to make sure that no one else will be able to identify you and what your responses were. Specifically, you will be assigned a code, any identifying information associated with your code will be confined to a single page that will be separated from your questionnaire, and kept in a separate and secured file by the research investigators who will keep this information confidential.

Right to Withdraw: Your participation in this study is entirely voluntary. At any point during the study you have the right to not complete certain questions or to withdraw with no penalty whatsoever.

*I have read the above description of the study concerning my reactions to virtual gambling. The data collected will be used in research publications and/or for teaching purposes. I will indicate below whether I consent to participate in this study. This in no way constitutes a waiver of my rights.

^C YES - I wish to participate in this study

^C NO - I do not wish to participate in this study

Appendix C: Debriefing

Thank you for participating in this study! This post-test information is provided to inform you of the exact nature of the study you just participated in. The outcomes on the slot machine you just played were predetermined to win or lose in a particular sequence. We were unable to disclose this part of the study to you at the onset because it would have influenced your behaviour and responses to the questions. As such, after you read this debriefing form, the experimenter will present a new informed consent form. The purpose of an informed consent is to ensure that you now understand the true purpose of the study and that you agree to allow your data to be used for research and teaching purposes. Because you were only told of the procedures and not the purpose of this study at the outset, we will be asking you for your consent to allow your data to be used for research and teaching purposes.

What are we trying to learn in this research?

Past research has found electronic gaming machines to be one of the most addictive forms of gambling. However, studies have largely focused on features of the gaming machines and their relationship to personality characteristics without looking at the way people make decisions when they are winning or losing. During the experiment we were investigating how the goals participants have for their gambling impact their decisions during play. We are especially interested in seeing if this has on impact on one's desire to continue gambling even when individuals are losing money.

Deception

Some of the information you received prior to the study was purposely misleading. Some of you were told that your chances of winning and losing were consistent with the payout rates at casinos in Ontario and Quebec and to "do your best" during the experiment. Other participants were told that they should be able to turn their \$20 of seed money into \$22 by the end of the experiment. In actuality the research team programmed your outcomes so that you either won or lost \$3. The extra spins you could play after completing the first round of spins were all programmed as losses. This was done so we could thoroughly study the factors that best predict why people continue to play when they are experiencing consistent losses. We have taken steps to protect your rights during this process. Every participant will be paid \$25 at the end of the study; as such the losses you experienced will not cost you money. We have also given you the opportunity to decline use of your data if you didn't feel comfortable with the process. Lastly, we have made preparations in the event that you feel an increase in your desire to gamble following this study.

What are the hypotheses and predictions?

Prior to starting play you filled out a battery of questionnaires, including some about your goals for today's play. In this experiment, all participants either won or lost \$3. We predict that...

• Individuals who were told they should finish with more money than they started with will continue to gamble longer than those told to "do your best."

- Individuals were told they should finish with more money than they started with will be less satisfied with their performance than told to "do your best."
- Different psychological profiles will also influence how long individuals continue to gamble during losses.

Why is this important to scientists or the general public?

This research will contribute to the knowledge and understanding of the role that decision making plays in gambling behaviour and problem gambling vulnerability. The findings from this research will help inform problem gambling treatment development, policy initiatives regarding responsible gambling and harm reduction, and future research avenues to better understand the influence that mood and motivational factors have on the decisions gamblers make in the face of losses.

What if I have questions later?

If you have any questions or comments about this research, then please feel free to contact Jamey (520-2600 ext. 6312; jamey_lister@carleton.ca) or Dr. Michael Wohl (520-2600 ext. 2908; michael_wohl@carleton.ca). If you feel that this experiment has influenced your behaviour towards gambling in any way (i.e. if you now have a craving, or urges, to gamble), please contact or speak to the experimenter immediately.

If you have any ethical concerns about this study please contact Dr. Monique Sénéchal (Chair of the Carleton University Ethics Committee for Psychological Research, 520-2600, ext. 1155; monique_senechal@carleton.ca) or Dr. Anne Bowker (Chair of the Department of Psychology at Carleton University, 520-2600, ext. 8218; anne_bowker@carleton.ca). This study has been approved by the Carleton University Ethics Committee for Psychological Research (11-128). Please use this number if you need to contact the Chair of the Department or Chair of Ethics Committee concerning this study.

Lastly, gambling may become harmful to ones relationships and well being, both emotionally and financially. The current research is in no way an endorsement to gamble but rather aims to discover ways to help and prevent problematic gambling. If you think you may have gambling problems, it is suggested that you contact one of the organizations listed below. It is not a good idea to allow problems to fester, as ruminating over these problems will typically not make them go away. In addition, your family physician or counsellor will may also be able to help you or to refer you to someone who can help.

- Ontario Problem Gambling Helpline: 1-888-230-3505 http://www.opgh.on.ca/
- Addictions and Problem Gambling Services of Ottawa: (613) 789-8941 http://www.sandyhillchc.on.ca/mainEngl/apgso_engl.html
- Distress Centre: Ottawa and Region: (613) 238-3311
 http://www.dcottawa.on.ca
- Health and Counselling Services at Carleton University: (613) 520-6674. http://www2.carleton.ca/health/

If you are interested in reading about other research related to gambling, you may wish to read the following articles:

Blaszczynski, A, & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, *97*, 487-500.

Dowling, N., Smith, D. & Thomas, T. (2004). Electronic gaming machines: Are they the 'crack-cocaine' of gambling? *Addiction*, *100*, 33-45.

Nower, L. & Blaszczynski, A. (2010). Gambling motivations, money-limiting strategies, and precommitment preferences of problem versus non-problem gamblers. *Journal of Gambling Studies, 26,* 361-372.

Sharpe, L., Walker, M., Coughlan, M.-J., Enersen, K., & Blaszczynski, A. (2005).
Structural changes to electronic gaming machines as effective harm minimization
strategies for non-problem and problem gamblers. *Journal of Gambling Studies, 21*, 503–520.

Wohl, M. J. A., & Enzle, M. E. (2003). The effects of near wins and losses on selfperceived personal luck and subsequent gambling behavior. *Journal of Experimental Social Psychology*, *39*, 184-191. If you do not have access to these articles and are interested in reading them, please contact one of the researchers listed above to receive a copy.

Thank you for participating in this study! Your assistance will help us better understand gambling behaviour among university students. We greatly appreciate your participation, but we ask that you refrain from discussing this study with potential participants (i.e., other undergraduate students) because their responses may be influenced.

Appendix D: Informed Consent to the Use of Data

The purpose of an informed consent is to ensure that you now understand the true purpose of the study and that you agree to allow your data to be used for research and/or teaching purposes. Because you were only told of the procedures and not the purpose of this study at the outset, we are now asking for your consent to allow your data to be used for research and/or teaching purposes.

Purpose. The purpose of this study is to assess the decisions that gamblers make during play.

Anonymity/Confidentiality. The data collected in this study are kept anonymous and confidential. The consent forms are kept separate from your responses.

Right to withdraw data. You have the right to indicate that you do not wish your data to be used in this study. If you indicate this is your choice, then all measures you have provided will be destroyed.

I have read the above description of the study investigating the role of decision making during gambling play. The data in the study will be used in research publications or for teaching purposes. Selecting "YES" below indicates that you agree to allow the data you have provided to be used for these purposes.

*Do you give us permission to use your data for research and/or teaching purposes?

- C YES I give the study team permission to use my data
- ^C NO I do not give the study team permission to use my data

Thank you for participating in this study, we greatly appreciate it!

Appendix E: Canadian Problem Gambling Inventory (CPGI)

Problem Gambling Severity Index (PGSI)

In the past 12 months how often ...

1. Have you bet more than you could really afford to lose?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

2. Have you needed to gamble with larger amounts of money to get the same feeling of excitement?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

3. Have you gone back another day to try and win back the money you lost?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

4. Have you borrowed money or sold anything to get money to gamble?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

5. Have you felt that you might have a problem with gambling?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

6. Have you felt that gambling has caused you any health problems, including stress or anxiety?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

7. Have people criticized your betting or told you that you have a gambling problem, whether or not you thought it is true?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

8. Have you felt your gambling has caused financial problems for you or your household?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

9. Have you felt guilty about the way you gamble or what happens when you gamble?

0	1	2	3
Never	Sometimes	Most of the time	Almost Always

Appendix F: Gambling Expectations Item and Subjective Goal Setting

Scale

Gambling Expectations Item (Not lose any...Win a lot)

What is your goal for today's gambling session?

- 1 Not lose any money
- 2 Not lose much money
- 3 Not lose a lot of money
- 4 Break even
- 5 Win a little money
- 6 Win a moderate amount of money
- 7 Win a lot of money

Subjective Goal Setting Scale (SD 1...SA 8)

- 1. It was very important to me to win more money than other participants.
- I wanted to win money in this gambling task so others could see my gambling ability.
- 3. I worried about the possibility of losing money during this gambling task.
- 4. The thought of ending the task with less money than other participants motivated me to do everything I could to win.
- Once I started losing my money on the task, I tried even harder to win my money back.

- 6. As I began to lose more and more money on the task, I started to feel like giving up.
- 7. I would have felt like playing for longer had I been experiencing more wins.
- 8. I enjoy gambling activities that involve risk so long as I have a chance to win.
- I would rather win a lot of money quickly than earn a similar amount over a longer period of time.

Appendix G: Demographic Information

1. Age _____

2. Sex

____ Male

____ Female

____ prefer not to say

3. Ethnic/racial background

____ Caucasian/European origin

- _____ Asian (Chinese, Japanese, Korean)
- _____ South Asian (East Indian, Pakistani, Punjabi, Sri Lankan)
- _____ South East Asian (e.g., Cambodian, Indonesian, Laotian)
- _____Black (e.g., African, Haitian, Jamaican, Somali)
- _____ Hispanic and South American Origin
- ____ Middle Eastern
- _____ Native Canadian/American
- ____ Other or multi-ethnic origin
- 4. Current employment status
 - ____ Not employed
 - ____ Part-time
 - Full-time

_____ Seasonal/Temporary/Contract

5. Are you currently a student?

____YES

____NO

6. If you answered YES to question 6, what is your student status?

_____ Full-time

_____ Part-time

_____ Special student

Appendix H: Behavioral Approach and Behavioral Inhibition Scales

Instructions: Each item of this questionnaire is a statement that a person may either agree with or disagree with. For each item, indicate how much you agree or disagree with what the item says. Please respond to all the items; do not leave any blank. Choose only one response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

Responses*

- 1 =very false for me
- 2 = somewhat false for me
- 3 = somewhat true for me
- 4 = very true for me
 - 1. A person's family is the most important thing in life.

2. Even if something bad is about to happen to me, I rarely experience fear or nervousness.

- 3. I go out of my way to get things I want.
- 4. When I'm doing well at something I love to keep at it.
- 5. I'm always willing to try something new if I think it will be fun.
- 6. How I dress is important to me.
- 7. When I get something I want, I feel excited and energized.
- 8. Criticism or scolding hurts me quite a bit.

9. When I want something I usually go all-out to get it.

10. I will often do things for no other reason than that they might be fun.

11. It's hard for me to find the time to do things such as get a haircut.

12. If I see a chance to get something I want I move on it right away.

13. I feel pretty worried or upset when I think or know somebody is angry at me.

14. When I see an opportunity for something I like I get excited right away.

15. I often act on the spur of the moment.

16. If I think something unpleasant is going to happen I usually get pretty "worked up."

17. I often wonder why people act the way they do.

18. When good things happen to me, it affects me strongly.

19. I feel worried when I think I have done poorly at something important.

20. I crave excitement and new sensations.

21. When I go after something I use a "no holds barred" approach.

22. I have very few fears compared to my friends.

23. It would excite me to win a contest.

24. I worry about making mistakes.

Items other than 2 and 22 are reverse-scored.

BAS Drive: 3, 9, 12, 21

BAS Fun Seeking: 5, 10, 15, 20

BAS Reward Responsiveness: 4, 7, 14, 18, 23

BIS: 2, 8, 13, 16, 19, 22, 24

Items 1, 6, 11, and 17 are fillers.

Likert order reversed following a consult with the scale author (Charles Carver). Original scale had positive affirmations at 1 and negative affirmations at 4, written so higher scores aligned with stronger agreement, done to match response style throughout entire survey

Appendix I: General Assessment/Deception Funnel

INSTRUCTIONS: Please answer the following questions <u>very briefly</u> in the space provided.

 Do you have any questions that you would like answered about the study so far? If so, what?

2. Has there been anything about the study so far that was disrupting, puzzling, or that you wondered about?

3. Please describe in your own words what you think the study is about.

4. Have you had cause to wonder whether or not there might be aspects of the study that have not been explained to you? If so, what have you had cause to wonder about?

Appendix J: Experimental Protocol Script

Before Participant arrives:

- 1) Assign participant code
- 2) Randomly assign to condition (via coin flip)
- 3) Start VR Worlds
- 4) Make sure correct script file is pasted
- 5) Load Survey Monkey, applicable Goal Setting script, and cognitive task

Experimenter: Hi, are you here for the gambling study? Good. I'm _____. Please follow me.

Experimenter: The computer in front of you is loaded with a questionnaire on Survey Monkey, the first page of which is the consent form. Please read the consent form thoroughly and then indicate whether or not you want participate in the study. I'll let you take a couple minutes to read it through and then I will briefly review the study with you before you decide on whether you wish to participate.

Participant reads consent

Experimenter: I will now briefly explain the project to you. As a result of your participation today, we are giving you \$20 with which to gamble. You will be gambling in a virtual reality casino in a little bit to help us better understand gambling behavior.

Whatever money you finish with will be yours to keep upon cashing out. You will also fill out some questionnaires during the project. In addition, you will perform a brief computerized cognitive task. Do you have any questions?

After consent is given

Experimenter: Thanks for agreeing to participate. You can go ahead and start the questionnaire now. You will know when you have completed this portion of the study when you see a page on Survey Monkey directing you to stop and check in with the study coordinator. Please do not continue beyond this point.

Participant begins online Survey Monkey questionnaire booklet

Experimenter: Thanks for completing that portion of the study. We have some information about the casino we would like you to read before gambling. **Show participants applicable script, let them read it over**

- A. Specific and Challenging script (experimental)
- **B.** Do Your Best script (control)

Experimenter: We have one quick item for you to fill out now.

Administer gambling expectations item

Experimenter: OK, now that you have completed that portion of the study, please come over to this computer and we'll discuss the virtual reality casino. Have you ever played a first-person-shooter video game on a computer before? The controls are very similar; use the WASD keys to move, and the mouse to look around. Clicking the mouse will perform actions, such as opening the doors to the casino or allowing you to sit at a slot machine. Once inside the casino you will see there are many different types of gambling available; for the purposes of this study you will only be playing the slots.

Have participant affix virtual reality headset, let them enter and walk around the virtual casino to acclimatize

Experimenter: It is a possibility that you may become dizzy or nauseous while using the equipment. This can happen especially if you are moving quickly or taking a lot of turns. If you find yourself feeling sick, just close your eyes and take a break. If you wish, we can continue when you feel better on the computer monitor.

Experimenter: Prior to playing, feel free to walk around the casino floor and select the slot machine you wish to play on. For the purposes of our study, we require that you only play on one slot machine.

After participant has acclimatized and picked a slot machine to play on

Experimenter: Okay, I'm going to help get you set up on this machine. If this is the machine you want to play, please click on it to sit down. First you must insert your money into the machine. We need you to enter your money slowly; entering it too fast can cause problems. Please press the enter key four times to enter all \$20.

Help participant input \$20, which equals 80 credits

Experimenter: Great, you can see now that the credit meter shows you have 80; each of these credits is worth 25 cents. You can keep track of your wins by looking at the win meter. Before you start, take a look at the payout table (see Appendix Q) which details for you the winning combinations.

Experimenter: For the purposes of our study, we require that you always bet one credit (\$0.25) per spin. To enter credits you will press the control key and space bar to spin the reels. Do you understand how the cash setup and machine play works? Let me know if you are not sure you understand how the credits or money work and I can explain it further.

Experimenter: I am going to watch your first spin just to make sure everything is working correctly. (If participant demonstrates proficiency) Great, you will now have 5 minutes to play. I will let you know when your time is up.

After 30th spin, experimenter will sound the timer and proceed around opposite side of divider

Experimenter: OK, that was your time. We now offer you one of two opportunities; you can continue gambling or you can cash out (experimenter alternates order of options). If you choose to continue gambling, the same rules as before will apply, i.e., whatever money you have left will be yours to keep. Also, if you choose to continue, you may gamble for as many spins as you like and are free to stop at any point.

Would you like to continue gambling or do you wish to cash out now?

If Continue, let participant keep playing. Experimenter will proceed to opposite side of divider and keep a running count of persistence spins in the data tracking booklet. Once participant indicates their wish to stop gambling, proceed to post-measurement.

If Cash Out, proceed to post-measurement.

Experimenter: You will now fill out some additional questionnaires about your gambling behavior and other demographic information.

Experimenter: (*Wisconsin Card Sorting Task*). Okay, thanks for completing those questions. Next you will perform a brief cognitive task. The instructions for the task are displayed on the screen.

Experimenter: *(General Assessment / deception funnel).* We have one last questionnaire that you will fill out with pen and paper. Let me know when you are finished (after participant completes, experimenter will put hard copy form in study case files).

Experimenter: *(Debriefing and Informed Consent to Use of Data).* You have now completed the study. Here is the debriefing which explains the purpose of the study. This study involved deception, so you will also have the opportunity to exclude the use of your data. Please look the form over and I will review the main points with afterwards.

answer any questions and review highlights of study with participant

Experimenter: OK, let's get you paid! You will receive \$25 for your participation.

participant fills out payment reconciliation sheet

Experimenter: Thanks again for your time!

Appendix K: Experimental Protocol Checklist

I. Measurement (pre)

- o Informed Consent
- o Behavioral Inhibition Scale/Behavioral Activation Scale (BIS/BAS)
- o PGSI
- Money Attitude Scale (MAS)
- o Eysenck Narrow Impulsiveness Scale
- o NEO-FFI
- Positive Affect Negative Affect Scale (PANAS-X, 31 item)

II. Goal Setting

- Goal Setting script
- Gambling Expectations item

III. Rideau Carleton Casino Protocol

- Acclimatization to virtual reality
- Slot machine play instructions
- 30 spins (5 minutes)
- Persistence Prompt Script
- Persistence Trial

IV. Measurement (post)

• Goal Setting Scale

- Goal Satisfaction Scale
- Gambling Craving Scale (GACS)
- Gamblers' Belief Questionnaire (GBQ)
- o Jacobs Dissociation Questionnaire (JDQ)
- Single Item Future Gambling
- Demographic Questionnaire
- Wisconsin Card Sorting Task
- o General Assessment / Funnel

V. Ethics and Payment

- Debriefing
- o Informed Consent to the Use of Data
- o Payment

Appendix L: Enumerated Data Tracking

Participant Code:
Participant Initials:
Experiment:
Manipulation (Goal Setting condition):
Experimenter:
Chasing (Yes / No):
Persistence Spin Count:
Experimenter Comments:

Appendix M: Perseverance Phenomenon Script

If at the end of the session a participant indicates they have an urge to gamble, the experimenter will also employ the debriefing method constructed by Ross, Lepper and Hubbard (1975). This method involves a mention of the perseverance phenomenon (i.e., continued experimentally created thoughts and feelings following the experimental session). Specifically, the experimenter will say:

Experimenter: I thank you for letting me know that you are feeling the urge to gamble. I appreciate your honesty. I would like to reiterate that in this experiment, we had experimental control over your wins and losses. As such, there is a possibility that you might be experiencing this urge to gamble as a result of the experimental procedure. Previous research has shown that making people aware of the possible continued effects of participating in an experiment (i.e., you current urge to gamble) can reduce the experiment's effect (i.e., reduce your urge to gamble).

Indeed, Ross and colleagues (1975) found that discussing the perseverance phenomenon eliminated post experimental effects. Even with this procedure in place, if a participant expresses an urge to gamble, the experimenter will strongly suggest the participant contact one of the health services numbers listing on the writing debriefing. In particular, the experimenter will say: **Experimenter:** Although research has shown that making participants aware of the potential lasting effects of an experiment can eliminate those effects, we strongly suggest you speak to a health care professional about your urges.

Lastly, the experimenter will offer to walk the participant to health and counselling services at Carleton University. The experimenter will say:

Experimenter: I know it can be difficult to take the step to speak to a professional. That is why I would like to help. Specifically, I would like to walk you down to the health and counselling services at Carleton to help you take this initial step. Would you like me to do that with you?

If the participant declines, the experimenter will once again stress the importance of contracting one of the numbers on the debriefing sheet.

Experimenter: I understand, however I do think it is important you to speak to a professional as soon as possible. When you leave the lab, I would ask that you contact one of the numbers listed on the written debriefing sheet I provided you. Again, I thank you for participating in this study. I hope that you take this opportunity to learn more about your gambling and ways that you can reduce the urges you are currently feeling. Unfortunately, I am not a health care professional, but by calling one of the numbers provided, you will be able to speak to one. Again, thank you for participating. We do

hope you will leave the lab more informed about gambling in general, and your gambling in particular.

If the participant accepts, the experimenter will walk the participant to health and counselling services at Carleton.

Experimenter: I thank you for taking me up on my offer. It will only take about 8 min to walk over there. Why don't we start heading down there!

Appendix N: Objective Goal Setting Script A

Specific and Challenging (experimental condition)

Thank you for playing with us.

We thought we would tell you how people are doing so far in the Rideau River Casino!

LAST 15 GAMBLERS

Credits: 89.6 (up 9.6 credits) Money: \$22.40 (up \$2.40)

We hope you experience similar success!



Appendix O: Objective Goal Setting Script B

Do Your Best (control condition)

Thank you for playing with us.

We thought we would remined you how much you have to gamble with at the Rideau River Casino!

*** GAMBLER INFO***

Credits: 80 Money: \$20

We hope you do your best!



Appendix P: Casino Scripts

Loss condition, Win condition, Persistence spins

Loss condition: Spins 1-30

- 0 indicates zero credits won, 5 indicates five credits won, 0* indicates a nearwin
- 30 credits played/lost, 18 credits won, net decline of 12 credits, i.e., start with
 80 credits and finish with 68
- Scripted 6 near-wins

The Loss condition was modified after testing with lab members in the following manner:

- Made final spin a win, therefore starting persistence at trial 31 and not before on trial 29
- Move up one win to the beginning, thereby putting participants ahead of their starting point, i.e. 81 credits after 6 spins
- Another loss script was created where participants would finish with 75 credits – this script was not employed due to concerns the losses weren't steep enough

Win condition: Spins 1-30

Win: 0 2 0 2 0 10 0 0 1 2 0 0 5 0 0 1 0* 5 0 1 0 1 0 5 0 0 1 0 1 5 = 92
- Win condition script was written using the loss condition as a baseline. This
 was done to control for extraneous differences in win/loss sequence (i.e.,
 effect of early wins).
- 30 credits played/lost, 42 credits won, net gain of 12 credits, i.e., start with 80 credits and finish with 92
- All near-wins (0*) were changed to wins of 1, all wins of 1 were changed to wins of 2, all wins of 5 were changed to wins of 10 with one exception spin 30 was kept as a win of 5 due to concerns that magnifying last win acutely prior to persistence may overshadow conditional differences and place more emphasis on last win effect. Spin 24 was changed from a win of 1 to win of 5.

Persistence spins

- All persistence spins were scripted as losses
- Persistence spins had a possible range of 0-68 spins in the loss condition
- Persistence spins had a possible range of 0-92 spins in the win condition
- Near-wins were scripted roughly 30% of the persistence spins, i.e., 22 of 68 in the loss condition (i.e., 32.4% near-wins), and 30 of 92 in the win condition (i.e., 32.6% near-wins)



Appendix Q: Rideau River Slot Machine Payout Table

Appendix R: VR Worlds

Participant Experience



Appendix S: Fulbright Canada Student Award

Foundation for Educational Exchange Between Canada and the United States of America



Fondation pour les échanges éducatifs entre le Canada et les États-Unis d'Amérique

April 29, 2011

Mr. James Lister 54 Hassart Street, Apt. B6 New Brunswick, NJ 08901-2560 United States

Dear Mr. Lister,

I am pleased to inform you that you have been selected to receive a Fulbright Canada award for study and/or research as a Fulbright Student at Carleton University.

In addition to having been screened by a multidisciplinary peer review committee convened by the Institute of International Education (IIE), your application has been approved by the J. William Fulbright Foreign Scholarship Board and the Academic Committee of the Board of Directors of Fulbright Canada.

As a Fulbright grantee, you join a prestigious group of approximately 300,000 Fulbrighters from more than 150 countries have participated in the Program.

Your Fulbright award carries a stipend that Fulbright Canada will release directly to you during your term of residence. The details of your stipend and release dates are outlined in the attached grant agreement. Additionally you will be provided with a health benefit plan and you will be offered enrichment opportunities during your residence in Canada.

As a Fulbright Canada student, you are eligible to benefit from enrichment opportunities available through the Mobility Program. You will receive an invitation to participate in the Fall Orientation in Ottawa, and up to CAD\$800 is available through the Professional Development Program. Additional information about this program will be sent to you once we have received your signed grant agreements.

We have enclosed your Fulbright grant agreements which set out the terms and conditions of your award. Please read these terms and conditions carefully and sign the grant agreements. Please mail both of the signed grant agreements on or before May 23, 2011 to Fulbright Canada (350 Albert St., Suite 2015, Ottawa, ON, K1R 1A4). I will sign these grant agreements. We will keep one, and we will return the other grant agreement to you for your records.

Travel arrangements and housing are your own responsibility. Please contact your host institution for assistance in this regard. Information regarding study and/or work permits, medical reports and press and publicity has been sent to you separately.

Fulbright Canada is supported by the Institute of International Education (IIE) in New York, NY, which assists in the administration of the Fulbright Program. In the coming months, you will receive materials with further information on your award from both Fulbright Canada and the IIE.

If you have any questions, please feel free to contact our Program Officer for Fulbright students, Michelle Emond at 613-688-5513. Congratulations on your award.

Sincerely,

0

Dr. Michael K. Hawes Chief Executive Officer, Foundation for Educational Exchange between Canada and the United States of America Executive Director, Canada-U.S. Fulbright Program

> 2015-350, rue Albert Street, Ottawa, Ontario, CANADA KIB 1A4 Telephone/téléphone 613.688.5540 - Fex/télécopieur 613.257.2029 - info@fulbright.ca

Appendix T: Carleton University Letter of Invitation



Office of the Director Carleton International 513 Tary Building 1320 Council by Drive Director, ON K15 BBC Canada Tab (613) 520-551 Fas: 1613 520-251

May 20, 2011

Mr. James John Lister III 54 Hossart St. Apt. B6 New Brinswick NJ 08901

Dear Mr. Lister,

On behalf of Carleton University. I am pleased to invite you as a Visiting Schular (Researcher) for a period of one year commoneing August 15th. 2011 to August 14th. 2012. You will be losted by Professor Michael Wohl from the Department of Usychology to assist in research within the Catleton University Gambling 1 ab (CUGE). Please review the terms and conditions of your appointment in our Visiting Appointments Policy (<u>http://www2.carleton.ca/secretariat/cems/wp-gonten/jecms-files/Visiting-Appointments-Policy.pdf</u>).

As a visitor to Carleton you will be responsible for making any accessary anangements for your own travel, accommodation and daily living expenses plus any additional expenses such as health insurance. It is understood that should they arise all other costs for your visit will be at your own expense.

You will be required to register for health insurance through UHIP (University Health Insurance Plan) while you are in Canada. For additional information on how to apply for the insurance, a detailed description of the enverage and cost, please visit the website at <u>www.nhip.co</u>. Upon your arrival to Carleton please visit the International Student Services Office to incke arrangements for your UHIP coverage.

You should consult with the Iromigration Section at the nearest Canadian Embaasy or Consulate to identify any Visa or Work Pennir requirements necessary for you to visit and conduct research in Canada. Please use this letter as an indication that you have been invited to come to Carieton University as a visitor. Those forward to welcoming you to Carleton University.

Yours Sincerely,

Randy Zadra Director, Carleton International

c.c. Professor Michael Wohl, Department of Psychology Professor John Oaborne, Dean, Baoally of Arts and Social Sciences Professor Janet Mantler, Chair Department of Psychology Mr. Tony Lackey, Manager, Risk and Insurance. Finance Department