

ABSTRACT

Title: EXAMINING THE INFLUENCE OF SENSATION SEEKING AND GENDER ON CONSUMERS' EMOTIONAL RESPONSES TO VISUAL STIMULI IN COMPUTER-SIMULATED SLOT MACHINES

Choonghoon Lim, Doctor of Philosophy, 2007

Dissertation Directed by: Dr. Stephen R. McDaniel, Associate Professor
Department of Kinesiology

Purpose: Based on research on gambling and consumer psychology, the current study examines the influence of individuals' sensation seeking and gender on their emotional responses to visual stimulation during computer mediated slot-machine gaming.

Methods: Following a pilot test to establish the reliability of scaled measures, as well as the validity of gambling stimuli and baseline treatments, data are collected from a sample of social gamblers (18+), as identified by the SOGS diagnostic. The experiment consisted of three phases. First, information on subjects' characteristics was gathered, including SS, gambling history, and gambling attitudes. Second, subjects participated in baseline tasks, designed to level their emotional states. Utilizing a randomized block design, participants (N = 200) then played a computer-mediated slot machine, with the conditions varying across groups in terms of level of

visual stimulation (speed/duration of spin). Subjects also completed self-report measures of emotion (PAD) relative to their gambling experience.

Results: Following the gambling and personality literature, data were analyzed separately by gender. Repeated measures ANOVA revealed no significant interaction effects between SS levels and visual manipulations, in terms of subjects' emotional responses. However, there were significant main effects of SS on A for males and on P for females. Further, there was a significant main effect of visual stimuli on A for males. A post hoc analysis found a significant main effect of winning sequence on D, where sequence of game/spin outcomes (win-near miss, near miss-win, win-miss disconnected) influenced perceived control.

Conclusion: This investigation is one of the first attempts to examine emotional response to certain features of slots in terms of SS. SS is not found to moderate visual stimulation effects on emotional responses for either sex. However, the data partially support the notion that certain emotions vary as a function of the main effects of SS or visual stimuli. The study results also indicate that males and females show different patterns of emotion within each treatment condition. Further, winning sequence is found to be a significant predictor for the D dimension of emotion. The applied/theoretical implications of the study's findings are discussed, along with future directions for research.

EXAMINING THE INFLUENCE OF SENSATION SEEKING AND GENDER ON
CONSUMERS' EMOTIONAL RESPONSES TO VISUAL STIMULI IN
COMPUTER-SIMULATED SLOT MACHINES

by

Choonghoon Lim

Dissertation submitted to the faculty of the Graduate School of the
University of Maryland, College Park in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2007

Advisory Committee:

Professor Stephen McDaniel, Chair
Professor Amy Haugler
Professor Bradley Hatfield
Professor Carl Lejuez
Professor Seppo Iso-Ahola

©Copyright by
Choonghoon Lim
2007

Acknowledgements

I would like to express my appreciation and gratitude to my advisor, Dr. Stephen McDaniel, for his guidance in this research. He provided me with support and wisdom, which enabled me to mature professionally and personally over the past several years.

Thanks are also due to the other members of my committee, Dr. Seppo Iso-Ahola, Dr. Bradley Hatfield, Dr. Amy Haufler, and Dr. Carl Lejuez for their advice and assistance. Without their advice, constructive criticism and genuine interest, completion of the project could not have been accomplished.

A special appreciation is also extended to Mr. Woo Young Lee, Dae Hee Kwak, and Joe Mahan whose assistance in obtaining subjects was particularly helpful and to Janine Middlemiss and Jaime Ryan for their help with computer programming in creation of the video slot machine treatments

Finally, I like to thank my mother, wife, and brother for their endless love, constant support and understanding throughout this endeavor

God bless all of you.

Table of Contents

Abstract	
Acknowledgements	ii
Table of Contents	iii
List of Tables	vi
List of Figures	vii
1 Introduction	1
1.1. History of Gambling	1
1.2. Prevalence of Gambling and Development of the Gambling Industry	3
1.3. Significance of the Current Study	5
1.4. Gambling Studies in the Social Sciences	6
1.5. Theoretical Background of the Current Study	9
1.6. Purpose of the Study	11
1.7. Hypotheses	12
1.7.1. Influence of ImpSS and Gambling Stimuli	12
1.7.2. Influence of Gender on Gambling	14
2 Literature Review	18
2.1. General Overview of Hedonic Consumption, OSL, and SS	18
2.1.1. Hedonic Consumption and Gambling	18
2.1.2. OSL Theory	22
2.1.3 Overview and Development of SS	24
2.2. General Overview of Personality and Gambling Research	27
2.2.1. The Relationship between SS and Risk-taking	27
2.2.2. SS and Gambling	28
2.2.3. Gambling and Emotion	30
2.2.4. Gambling and Arousal	36
2.3. General Overview of Gambling Studies	40
2.3.1. Heterogeneity of Gambling Forms	40
2.3.2. Structural Characteristics of Slot Machines	44
3 Methodology	49
3.1. Overview	49
3.2. Sample	50
3.3. Independent Variables	51
3.3.1. The South Oaks Gambling Screen (SOGS)	51
3.3.2. Impulsive Sensation Seeking (ImpSS)	52
3.3.3. Gambling Attitudes and Beliefs Survey (GABS)	53
3.3.4. General Information on Gambling Participation	54
3.3.5. Demographics: Gender and Age	54
3.4. Validity Checks	55
3.4.1. Brief Sensation Seeking Scale (BSSS)	55
3.4.2. Visual Complexity (VC)	55
3.5. Dependent Variables	56
3.5.1. Emotion (Pleasure-Arousal-Dominance)	56
3.6. Apparatus and Gambling Stimuli	57
3.7. Procedure	58

3.7.1. Pilot Study	58
3.7.2. Phase 1: Pretest and Preparation for Main Study	61
3.7.3. Phase 2: Familiarization and Instruction	63
3.7.4. Phase 3: Gambling, Baseline and Measurement,	64
3.8. Manipulations	66
3.9. Data Analysis	67
4 Results	68
4.1. Pilot Study	68
4.2. Main Study Sample Description	69
4.3. Reliability	73
4.4. Validity	74
4.4.1. Construct Validity	74
4.4.2. Predictive Validity	75
4.4.3. Internal Validity	75
4.5. Hypotheses Testing – Hypothesis One	78
4.5.1. Interaction effects of ImpSS and Experiment Condition on Levels of Arousal	79
4.5.2. Main Effects of ImpSS and Experiment Condition on Levels of Arousal	81
4.6. Hypothesis Testing- Hypothesis Two	83
4.6.1. Interaction Effects of ImpSS and Experiment Condition on Levels of Pleasure	84
4.6.2. Main Effects of ImpSS and Experiment Condition on Levels of Pleasure	86
4.7. Hypothesis Testing – Hypothesis Three	87
4.8. Post Hoc Test – Effects of Winning Sequence and Experiment Condition	89
5 Discussion	92
5.1. Discussion of the study results	92
5.1.1. Influence of SS on PAD	92
5.1.2. Influence of Gender on PAD	97
5.1.3. Influence of Winning Sequence on PAD	100
5.2. Limitations	101
5.3. Implications for Future Research	103
6 Appendices	107
Appendix 1: South Oaks Gambling Screen	107
Appendix 2: Impulsive Sensation Seeking Scale	110
Appendix 3: Gambling Attitudes and Beliefs Survey	112
Appendix 4: Brief Sensation Seeking Scale	114
Appendix 5: Perceived Complexity	115
Appendix 6: Pleasure-Arousal-Dominance Scale	116
Appendix 7: Email protocol for On-line Survey Participation	117
Appendix 8: Experiment Instruction 1	118
Appendix 9: Experiment Instruction 2	119
Appendix 10: Landscape Picture 1	120
Appendix 11: Landscape Picture 2	121

Appendix 12: Experiment Instruction 3	122
Appendix 13: Experiment Instruction 4	124
Appendix 14: Experiment Permutations	126
Appendix 15: Computer Simulated Slot Machine	127
7 References	128

List of Tables

Table 1. Descriptive Statistics of Age, Gender, and Pre-experiment behaviors (Exercise, Consumption of Caffeinated Drinks, and Smoking) on the Day of Experiment	70
Table 2. Descriptive Statistics of Participation in Each Type of Gambling over the Past 6 Months by Gender	72
Table 3. Number of Items, Range, Mean, SD, and Reliability of Scaled Measures	73
Table 4. Zero-order Correlations between GABS, ImpSS, BSSS, Imp, and SS	74
Table 5. Zero-order Correlations between ImpSS, GABS, Gambling participation over the Last Six Months, and Smoking on the Day of Experiment	75
Table 6. Number of Subjects in Each Treatment Condition by Gender and ImpSS	76
Table 7. Mean and SD of Baseline Arousal and Pleasure	77
Table 8. Independent Sample T-tests for Group Differences in Baseline Level of Arousal and Pleasure by Exercise, Caffeine Consumption, and Smoking	77
Table 9. Bartlett's Test of Sphericity between Baseline Arousal and Gambling Arousal for Males and Females	79
Table 10. Effects of Experiment Task, ImpSS, and Condition on Levels of Arousal for Males.	80
Table 11. Effects of Experiment Task, ImpSS, and Condition on Levels of Arousal for Females.	81
Table 12. Barlett's Test of Sphericity between Baseline Pleasure and Gambling Pleasure for Males and Females.	84
Table 13. Effects of Experiment Task, ImpSS, and Condition on Levels of Pleasure for Males.	85
Table 14. Effects of Experiment Task, ImpSS, and Condition on Levels of Pleasure for Females.	85
Table 15. Effects of ImpSS and Condition on Levels of Dominance	88
Table 16. Effects of Condition, and Winning Sequence on Levels of Dominance	90

List of Figures

Figure 1. Main effect of ImpSS on levels of arousal for male subjects	82
Figure 2. Main effect of treatment condition on levels of arousal for male subjects	83
Figure 3. Main effect of ImpSS on levels of pleasure for female subjects	87
Figure 4. Main effect of treatment condition on levels of dominance for male subjects	88
Figure 5. Main effect of treatment condition on levels of dominance for female subjects	89
Figure 6. Main effect of winning sequence on levels of dominance	91

CHAPTER I

Introduction

Based on theories of SS and gambling psychology, the current study attempts to experimentally examine the influence of SS on emotional responses to varying levels of visual stimulation during slot-machine play, as well as to explore gender differences in those emotional responses. Among other types of visual stimulation, this study investigates gamblers' emotional responses to reel speed and duration of reel spinning as a function of their need for stimulation and of their gender.

This chapter includes a cursory history of gambling, followed by an overview of the prevalence of gambling and the development of the gambling industry, a discussion of the significance of the current study, a review of gambling studies in the social sciences, the theoretical background, and the purpose and hypotheses of the present study.

1.1. History of Gambling

Gambling is a social activity that can be traced back more than 4,000 years; evidence of gambling has been found in most ancient cultures, including China, Egypt, India, Athens, and Rome (Petry, 2005). For example, Egyptians gambled with dice, and people in Athens played board games, while ancient Asian and Arabian peoples gambled with tokens or coins (McMillen, 1996). Davis and Abram (2001) suggest that sports wagering also has a very long history; ancient Egyptians bet on chariot races, while Romans wagered on gladiatorial contests. Despite its current universality, gambling's popularity and acceptability has fluctuated over time, based on cultural and environmental factors. For example, casino gambling was a popular leisure

activity in Italy from the 12th century to the 15th century, but lost its popularity from the 16th century to the 19th century (McMillen, 1996).

Gambling in the United States began in the earliest settlements and continued to grow until the 18th century. After a hundred-year lull in the popularity of gambling, it flourished again after the Civil War, but gradually lost its popularity as a leisure activity (McMillen, 1996). A clear marker of gambling's decline came when the state of Nevada passed anti-gambling legislation in 1910. Somewhat paradoxically, after fifty years of strict governmental controls on the gambling industry, these interventions came to be seen as legitimizing gambling (e.g., legalization of gambling in Nevada in 1931, revival of horse racing wagering in the 1930's and the resurgence of state lotteries in the 1960's). This trend continues today as gambling is one of the most prevalent leisure activities in the United States (Dunstan, 1997; McMillen, 1996). Recently, the U.S. gambling industry has experienced an unprecedented increase in the availability of both legal and illegal gambling (Breen & Zuckerman, 1999; McDaniel & Zuckerman, 2003; Welte, Barnes, Wieczorek, & Parker, 2002).

This increased popularity is not limited to North America—it is also a global phenomenon; gambling, as a leisure activity, has increased in popularity in the UK (Bruce & Johnson, 1996), Turkey (Duvarici & Varan, 2000), Korea (Back & Lee, 2005) and Australia (Dickerson, Walker, England, & Hinchy, 1990). Furthermore, with the development of Internet technology, the popularity and availability of gambling are growing at progressively faster rates (National Gambling Impact Study Commission [NGISC], 1999). According to the NGISC (1999), the increasing number

and variety of interactive games, such as cyber-casinos, raise concerns about underage gambling and pathological gambling.

1.2. Prevalence of Gambling and Development of the Gambling Industry

Claussen and Miller (2001) posit that there are several reasons for the increased popularity of gambling in the United States, including the deterioration of Judeo-Christian morality and the Protestant work ethic, an acceptance of a deterministic worldview, legitimate governmental support (e.g., state lotteries), and the availability of new technologies (e.g., the Internet). As a result, gambling has become a multi-billion dollar industry. In the U.S., for instance, some kind of wagering is legalized in forty-seven states, while only Utah, Tennessee, and Hawaii do not sanction any form of gambling. According to the 1999 NGISC report, 47 states have lotteries, 28 states have legalized casinos, and 43 states have pari-mutuel betting (e.g., betting on horse and dog racing), while revenues from gambling is report to have increased nearly 1,600 % between 1976 and 1997. The NGISC (1999) estimates that one out of ten dollars expended on leisure was spent on gambling, indicating that Americans spent approximately \$50.9 billion in gambling in 1997. The Commission report states that gambling provides over 700,000 jobs with wages of about \$21 billion, making gambling an important industry in terms of impact on national economy, as well as on local economies.

In their national survey on gambling behaviors of Americans, Welte, Barnes, and Wieczorek (2002) find that the lottery is the most common gambling activity and that casino gambling accounts for the largest amount of money spent. According to their results, 82% of respondents had gambled at least once in the past year. They also

find that gambling behavior is related to demographics, such as socio-economic status, age, gender and ethnic background. For example, men in the study report gambling more frequently than women, especially in games of skill (e.g., cards, dice and sports betting), while more African-Americans report participating in every type of gambling activity compared to Caucasians, with the exception of bingo and charitable gambling (Welte et al., 2002).

As gambling has become one of the most widespread forms of leisure activity in our culture, there is growing concern regarding increasing levels of gambling by youth, including high school and college students (Engwall, Hunter, Steinberg, 2004; Gost, 2000; LaBrie, Shaffer, Laplante, & Wechsler, 2003). For instance, Shaffer, Hall and Vander-Bilt (1999) report that while 1.9% of American adults were diagnosed as pathological gamblers, the rate of young adult gambling problems is almost double that of adults: 3.38% of adolescents report that they have a gambling disorder. Rates for gambling disorders among college students achieve an even higher level, with 5.56% reporting problems (Shaffer et al., 1999). Subsequently, Ladouceur (2004) proposes further examination of the gambling behavior of college students and young adults since the prevalence of gambling-related problems among young people significantly exceeds the rate of gambling problems among adults. Moreover, it is estimated that among 2,000 college basketball and football players, 25.5% have bet on a college sporting event while in school (NGISC, 1999).

Further, youth gambling is one of the most important social issues when considered along with the economic costs of legalized gambling and cyber-casinos on the Internet (Breen, 2000). For example, there have been several incidences where

college students were responsible for establishing illegal bookmaking networks at various universities (Engwall et al., 2004). Additionally, college student athletes have been implicated in several scandals related to betting on sports (NGISC, 1999; Oster & Knapp, 1998). Oster and Knapp (1999) find that 42% of their sample of college students (52% male and 33% female) report gambling at least once in the previous school year, and that 2.6% report gambling weekly or more frequently. LaBrie et al. (2003) find that lottery gambling is the most popular type of gambling among their college student sample (45%), followed by casino gambling (30%), and playing cards or dice with friends (13%).

1.3. Significance of the Current Study

Examining gambling behaviors of American consumers (e.g., college students) is important since gambling is linked to other risky behaviors (LaBrie, Shaffer, LaPlante, & Wechsler 2003; Engwall et al., 2004). For example Labrie et al. (2003) suggests that gambling is positively correlated with other risky behaviors such as drinking, smoking, and drug use. Engwall et al. (2004) support the notion of a positive relationship between gambling and other risky behaviors. For instance, according to Engwall et al. (2004), the college students in their study, who report engaging in several risky activities (such as excessive use of alcohol, unprotected sexual activity, driving while intoxicated, and using illicit substances), also report gambling. Among their sample, 18% of men and 4% of women reported experiencing gambling-related problems with several negative consequences such as “feeling guilty” and “gambling more than intended” (Engwall et al., 2004). Furthermore, they find a significant discrepancy between the prevalence of problem gambling among the college student

population and the awareness of the problem among educators and school administrators.

Gambling also plays a socially and economically significant role in the sports industry. Some suggest that wagering on sports events is the most popular form of illegal betting to date and is also the fastest growing form of legalized gambling (Frey, 1987; NGISC, 1999). For instance, betting on legal sports books in Nevada totaled nearly \$2.3 billion in 1998, providing revenue of \$77.4 million. It is estimated that the totals would be much larger, anywhere from \$80 billion to \$380 billion, if illegal wagering on sports had been included in the totals (NGISC, 1999). Claussen and Miller (2000) indicate that betting on amateur sports is an important part of sports betting. For instance, Lee (2005) reports that as much as \$90 million has been wagered in Las Vegas on a single annual college basketball tournament.

Gambling can also influence other sports-related consumption. For example, to aid their sports betting, consumers seek information that may factor into their gambling decisions, such as point spreads, odds, starting line ups and injury reports, by watching sports news on TV, listening to sports talk shows, and reading sports columns in newspapers (D'Angelo, 1987). More overtly, sports channels such as ESPN and Fox Sports Net are currently televising poker tournaments such as "The World Series of Poker," covering gambling as sports-like (competitive) events.

1.4. Gambling Studies in the Social Sciences

Scholars undertaking gambling research have different explanations for gambling behavior, based on their particular disciplinary and/or theoretical perspectives. Also, different approaches to gambling research are often influenced by

researchers' philosophical world-views and the contexts of the gambling environments they study. The various social sciences that have contributed to our understanding of gambling include: sociology, political science, management, marketing, psychology, economics, philosophy, law, and criminology. Walker (1992, p 2-3) argues that the social sciences broaden our understanding of gambling, answering questions such as "What is the nature of problem gambling?"; "What is the prevalence of problem gambling?"; "What are the demographic factors associated with gambling involvement?"; and "How broad is the range of gambling activities?" Each discipline focuses on slightly different realms of gambling phenomena. For example, the sociology of gambling analyzes the social functions of gambling (e.g., escaping from work); the social relationships between gamblers; the structural links between gambling and socio-economic conditions, the social content of gambling situations; the legalization of gambling; and gambling policy issues (Aasved, 2003; McMillen, 1996). Gambling research in political science often emphasizes policy making, political processes, and institutions, exploring such topics as industrial policies, government-business relations, decision making by state governments, policy outcomes, and interest-group politics (McMillen, 1996). Gambling research in marketing covers various areas of gambling such as gambling promotion, gamblers' consumption experiences (e.g., satisfaction, retention, purchase intention and expectations), business relations, and gambling technology (Jolley, Mizerski, & Olaru, 2006; Loroz, 2004; Seonmi Youn, Faber, & Shah, 2000)

There are also many psychologically-oriented studies, accounting for gambling attitudes and motivations, as well as behaviors of individuals during gambling

activities. Further, each sub-discipline (or paradigm) examines gambling psychology from a slightly different perspective. For instance, a psychodynamic approach focuses on an individual's gambling behaviors and/or his or her gambling addiction in terms of subliminal mentality, psychological conflict, sexual desires, and self-deception (Aasved, 2002). Additionally, a Freudian approach attempts to analyze gambling behaviors in terms of wish-fulfillment and conflict-reduction functions (Kusyszyn, 1984). On the other hand, behavioral psychologists, based on either Skinner's model of operant conditioning or Pavlov's classical conditioning theories, explain gambling addiction and compulsive gambling as processes of learning and reinforcement (Aasved, 2002).

The current study is based on personality psychology, which assumes that people's attitudes and behaviors are related to their individual psychological characteristics (Aasved, 2002). Most personality research attempts to identify those personality traits that influence gambling problems or addiction. Early personality research on gambling was also heavily based on psychoanalytic theory; researchers employed power theory and dependency conflict theory to explain problem gambling (Aasved, 2002). While there have been several criticisms of early personality research on gambling alleging a lack of empirical support and potential sampling biases, more recent attempts to examine the influence of personality on gambling behaviors employ arousal theory (Aasved, 2002). According to arousal theory, individuals have a unique level of optimum stimulation, which they attempt to increase or to reduce in order to maintain certain levels of arousal (Steenkamp & Baumgartner, 1992; Raju, 1980). Arousal theory also assumes that gambling produces emotional excitement and that

gambling is motivated by boredom or hypoarousal (Aasved, 2002). Both behavioral psychologists and personality researchers explain gambling behaviors using arousal theory, but they can employ different theoretical approaches. For instance, behavioral psychologists account for gambling behaviors as reinforcements to sensory stimulation and emotional excitement (Anderson & Brown, 1984, 1986; Sharpe, Tarrier, Schotte, & Spence, 1995).

Personality psychologists often focus on individual differences in Optimum Stimulation Level (OSL), which affects such factors as individuals' responses to various forms of gambling (McDaniel & Zuckerman, 2003; Zuckerman, 1994). Zuckerman (1994) argues that high sensation seeking (HSS) individuals pursue stimulation to maintain a high OSL. He has also documented a positive relationship between SS and gambling participation, arguing that gambling provides people with stimulation when they win and sensory arousal during the period of uncertainty. Researchers also note a positive relationship between SS and risk-taking, observing that the financial risk and potential money loss involved in gambling offer gamblers a desired level of psychological stimulation (Jack & Ronan, 1998; Lejuez, Read, Hahler, Richards, Ramsey, Stuart, Strong, & Brown, 2002; Zuckerman, 1994).

1.5. Theoretical Background of the Current Study

The current study extends gambling studies by examining the influence of OSL on gamblers' emotions, using a hedonic consumption paradigm from the literature in consumer research (Hirschman & Holbrook, 1982, Holbrook Chestnut, Oliva, & Greenleaf, 1984; Holbrook & Hirschman, 1982). The hedonic approach focuses on emotional responses (e.g., sensory pleasure and aesthetic enjoyment) and

fantasy/daydreams, and this could broaden our understanding of gambling behaviors since emotion is an important part of the gambling experience (Holbrook et al., 1984; Titz et al., 2002). However, while there is an agreement that gambling provides people with various emotional responses (e.g., excitement), there has been little attempt to examine the influence of an individual's OSL on emotional response to stimuli (e.g., visual stimuli) during the subject's participation in different forms of gambling. Moreover, while most gambling studies tend to consider gambling as a deviant activity and to neglect the fact that gambling is a socially legitimated leisure activity (Abt, McGurrin, & Smith, 1985), a hedonic approach views gambling as playful leisure activity (Holbrook & Hirschman, 1982; Holbrook et al., 1984). In fact, most gamblers are infrequent gamblers; consequently, examining the broader spectrum of behaviors, from the social to the pathological, may offer a better understanding of gambling (Dickerson & Baron, 2000).

The current study is based, in part, on Dickerson and Baron's (2000) argument that studies on the relationship between gambling and personality should focus on regular gamblers rather than on pathological gamblers (as is often the case), since the variance of regular gamblers' behavior is larger than that of pathological gamblers (and may offer a basis of comparison and subsequent insight into the latter).

Furthermore, Dickerson and colleagues suggest that gambling problems can be examined not only retrospectively in pathological gamblers, but also prospectively in social gamblers (Dickerson, 1993; Dickerson & Baron, 2000). Therefore, the gambling behaviors of infrequent/social gamblers need to be examined.

In addition to the sampling issues mentioned above, Dickerson and Baron (2000) argue that, while the literature on the influence of the SS trait on gambling behaviors reports contradictory results on the influence of the trait, this might be a function of failing to include other important personality measures (i.e., that either gauge impulsivity or modified versions of original SSS Form V which include it, such as the impulsive sensation seeking (ImpSS) inventory). In fact, some recent studies employ the ImpSS, in recognition of the possibility that impulsivity and SS have a combined influence on gambling behaviors (cf. Breen & Zuckerman, 1999; McDaniel & Zuckerman, 2003). Further, some argue that gambling behaviors for men and women are different and that the behavioral tendencies for each gender group should be examined independently (Chantal, Vallerand & Vallieres, 1995; Kassinove, 1998; McDaniel & Zuckerman, 2003). For instance, McDaniel and Zuckerman (2003) find that there is a slight gender difference in relationships between ImpSS and gambling behaviors.

In conclusion, the current study adds to previous gambling literature on the influence of OSL on gambling behaviors by focusing on the potential effects of personality (ImpSS) and gender on the response of social gamblers to certain types of visual stimulation after playing a computer-mediated slot machine.

1.6. Purpose of the Study

The primary purpose of the current study is to investigate how an individual's OSL might influence gamblers' emotional responses to visual stimulation in slot machines. The research extends the gambling literature, since there have been calls for studies pinpointing the factors that affect gamblers' sensory arousal and emotional

excitement (Ladouceur & Sevingny, 2002). Examining the influence of SS and visual stimulation on gamblers' emotions may provide face validity, since visual stimulation affects sensory arousal (Dowling, Smith, & Thomas, 2005; Griffiths, 1999; Ladouceur & Sevingny, 2002). Moreover, the study examines how individual differences moderate the relationship between visual stimulation and gambling behaviors. Despite a few attempts to examine the influence of visual stimulation on gambling behaviors, Dowling et al. (2005) argue that these studies employ simultaneous manipulations of several features, and thus, effects of specific game characteristics have not been examined independently.

1.7. Hypotheses

1.7.1. Influence of ImpSS and Gambling Stimuli.

McDaniel and Zuckerman (2003), among others, argue that gambling is not monolithic and that each gambling type provides gamblers with a different experience. Previous studies also suggest that gambling is not homogeneous in terms of continuity, dimension, timing, stake size, or visual and auditory stimuli (Breen & Zimmerman, 2002; Dickerson, 1993; Dowling et al., 2005). Research findings in this domain also indicate that each gambling experience represents a unique level of arousal potential, and thus an individual's SS level might influence usage and response patterns (Coventry & Brown, 1993; McDaniel & Zuckerman, 2003; Titz, et al., 2002). For example, Coventry & Brown (1993) find that off-course bettors score lower on SSS Form V, while casino and racetrack gamblers score higher on SSS Form V. However, little is still known about which aspects or dimensions of gambling stimuli are the determinants of arousal potential.

Slot machines are one activity that provides gamblers with a unique level of stimulation and experience, since they incorporate a variety of structural characteristics given their innate audio and video technology (Dowling et al., 2005; Griffiths, 1993; Wood, Griffiths, Chappell, & Davis, 2004). In spite of high levels of sensory (i.e., audio & visual) stimulation, slot machine studies produce contradictory evidence when analyzed for results regarding arousal potential (cf. Coventry & Constable, 1999; McDaniel & Zuckerman, 2003). Thus, there is a need to reexamine the relationship between individual's SS and slot-playing behaviors.

According to Griffiths (1993), structural characteristics inherent in slot machines include rapid reel speeds, multiplier potential, a range of machine denominations, multiple coin and note acceptors, credited wins, and other audiovisual effects. Dowling et al. (2005) posit that the structural characteristics of slot machines are responsible for reinforcement by satisfying gamblers' needs and thus may actually facilitate excessive gambling.

Previous studies suggest that the audiovisual effects of slot machines influence gambling behaviors. For instance, Dowling et al. (2005) point out that visual (e.g., color, lights, and symbols) and auditory stimuli (e.g., buzzers, musical tunes, and sounds of coins falling into metal trays) are employed to facilitate continual fun, to produce an impression of winning more often than losing, and to increase emotional tension and psychological activation. Likewise, other studies suggest that visual effects, such as visual complexity, symbol presentation modality, graphics, and color, influence gambling behaviors (Christopherson & Weatherly, 2006; Griffiths, 2003; Stark, Saunders, & Wookey, 1982). Moreover, some argue that speed and duration of

reel spinning in slot machines are visual effects that function as constant sensory stimulation (Loba, Stewart, Klein, Blackburn, 2002; Sharpe et al., 2005; Wood et al., 2004). For example, Sharpe et al. (2005) finds the duration of reel spinning to be a sensory feature that influences gambling behaviors. Additionally, Loba et al. (2002) compare high-sensory conditions (high reel speed and sound) and low sensory conditions (i.e., low reel speed and no sound) and find significant group differences in terms of levels of excitement, enjoyment, and tension, as well as effects, such as difficulty in stopping play and desire to play again. However, they simultaneously manipulate two sensory (i.e., visual and audio) features and call for examination of each manipulation independently in order to isolate independent effects of each modality.

Given that visual effects, including speed and duration of reel spinning, are involved with sensory stimulation, it is reasonable to assume that each individual responds to the features differently as a function of his or her need for stimulation (Loba et al., 2002). Emotion is argued to play as important a role in gambling (Titz et al., 2002), as is the case in other experiential or recreational behaviors such as sport and other games (Holbrook & Hirschman, 1982). Thus, the present study attempts to examine the influence of an individual social gambler's OSL on their emotional response to visual effects, including reel speed and duration of reel spinning.

1.7.2. Influence of Gender on Gambling.

The existence of gender differences in risk-taking behaviors, including gambling, is empirically supported in a number of studies (Lejuez et al., 2002; McDaniel & Zuckerman, 2003; Zuckerman & Kuhlman, 2000). For example, males

report engaging in significantly greater numbers of risk-taking activities such as drinking, smoking, drug use, and gambling (Zuckerman, 1994; Zuckerman & Kuhlman, 2000). Previous studies also suggest the need to consider gender differences in gambling behaviors, since females react differently compared to males, in various aspects of their gambling behaviors, including: performance, risk-taking strategies, level of interest, and level of participation (Bruce & Johnson, 1996; Lejuez et al., 2002; McDaniel & Zuckerman, 2003). Further, studies find males report more favorable attitudes towards gambling than females (Chantal et al., 1995; Kassinove, 1998; Lejuez et al., 2002). Bruce and John (1996) report that females outperform males in terms of off-course betting. Kassinove (1998) finds that study participants differ by gender, in terms of their preferences for various types of gambling activities: male respondents report significantly greater preferences for casino gambling and wagering on horse racing than females. Likewise, other research suggests that males prefer games of skill, while women prefer games of chance and greater variety in gaming activities than males (Delfabbro, 2000). In a similar study, Potenza, Steinberg, McLaughlin, Wu, Rounsaville and O'Malley (2001) report information from callers to a gambling help-line that indicates males preferred what the authors characterize as more "strategic" and/or social gambling activities (e.g., blackjack or poker). Conversely, female callers in the study indicate their preference for "non-strategic" and less social or interactive gambling forms, such as slot machines.

Scholars argue that gender differences in the above activities may be a function of SS, given that males exhibit higher levels of the trait than females (Zuckerman & Kuhlman, 2000). For example, McDaniel and Zuckerman (2003) findings indicate that

male and female respondents exhibit different relationships between their ImpSS levels, gambling interest, and participation in different types of gambling.

While a number of studies support the gender differences in gambling behavior, there are those who contend that too much of the research in this area has focused on males (Mark & Lesieur, 1992; McDaniel & Zuckerman, 2003). It is possible that the exclusion of females from studies might result in Type II errors with regard to mixed findings on the relationship between gambling activities, SS, and/or psychological arousal (Coventry & Constable, 1999; Mark & Lesieur, 1992). This has led to a call for more gambling research involving both men and women, where separate models are run by gender, given the differences noted above (Dickerson & Baron, 2000; Mark & Lesieur, 1992; McDaniel & Zuckerman, 2003).

Based on the above studies on effects of ImpSS, gambling stimuli (visual stimuli), and gender, the following hypotheses will be tested:

H1: ImpSS will moderate the effects of reel speed and spin duration on subjects' level of arousal.
H1a: ImpSS will moderate the effect of reel speed on subjects' level of arousal for male subjects.
H1b: ImpSS will moderate the effect of reel speed on subjects' level of arousal for female subjects.
H1c: ImpSS will moderate the effect of spin duration on subjects' level of arousal for male subjects.
H1d: ImpSS will moderate the effect of spin duration on subjects' level of arousal for female subjects.

H2: ImpSS will moderate the effects of reel speed and spin duration on subjects' level of pleasure.
H2a: ImpSS will moderate the effect of reel speed on subjects' level of pleasure for male subjects.
H2b: ImpSS will moderate the effect of reel speed on subjects' level of pleasure for female subjects.
H2c: ImpSS will moderate the effect of spin duration on subjects' level of pleasure for male subjects.

H2d: ImpSS will moderate the effect of spin duration on subjects' level of pleasure for female subjects.

H3: ImpSS will moderate the effects of reel speed and spin duration on subjects' level of dominance.

H3a: ImpSS will moderate the effect of reel speed on subjects' level of dominance for male subjects

H3b: ImpSS will moderate the effect of reel speed on subjects' level of dominance for female subjects

H3c: ImpSS will moderate the effect of spin duration on subjects' level of dominance for male subjects

H3d: ImpSS will moderate the effect of spin duration on subjects' level of dominance for female subjects.

Chapter II

Literature Review

The intent of this literature review is to present theoretical principles and empirical research which pertain to the influence of personality and gender on gambling behaviors. This chapter begins with a general overview of the hedonic consumption paradigm, OSL and SS. Subsequently, studies concerning the relationship of gambling to risk-taking, sensory arousal, gender and SS are discussed. Finally, the researcher reviews literature regarding gambling in terms of heterogeneity and structural characteristics, followed by an overview of studies on emotion during gambling activities.

2.1. General Overview of Hedonic Consumption, OSL, and SS

2.1.1. Hedonic Consumption and Gambling

Recent gambling studies employ various approaches to examine the expansion of legalized gambling, the growth of gambling populations, and the creation of new types of gambling activities such as Internet gambling (Abt, McGurrin & Smith, 1984; Titz et al., 2002). Furthermore, gambling research traverses various academic disciplines, including economics, management, clinical/cognitive psychology, anthropology, and sociology. However, while considerable research on gambling exists, most studies focus on issues related to pathological gambling and problem behaviors (McDaniel & Zuckerman, 2003; Titz et al., 2002). As a result, current social science considers gambling a deviant activity and neglects the fact that gambling is a socially organized and socially defined activity (Abt & Smith, 1983; Abt et al., 1984).

Abt et al. (1984) argue that for several reasons there is a need to view gambling as play, as a recreational game or sport, not as a detrimental activity for the individual or society. First, gambling is a type of game in that it is a highly rational, socially organized, rules-governed activity with legitimate winning and standardized equipment. Second, like sport and play, gambling also has social functions in terms of reaffirming cultural norms and values, and it is integrated with sports and games. Third, gambling, sport, and play share common characteristics as recreational activities. For example, both gambling and other types of play are voluntary activities, are frequently intense, and are usually ends in themselves. Abt et al. (1984, p. 213) argue that “Gamblers do not play because they subconsciously want to lose—they play because they want to play.” Finally, gambling creates a recreational subculture in our society, providing people with entertainment and guidelines in terms of values, virtues, social roles, and life style (Abt et al., 1984).

In past research on consumer behavior, an “information processing” (IP) approach has often been the dominant paradigm, focusing on cognition and assuming that people are logical, rational, and analytical beings and that all human behaviors are objective (Hirschman & Holbrook, 1982). Given the emphasis on rational choices and utilitarian benefits, IP-based studies tend to focus on tangible products, attitudes, and cognitive processes (Holbrook & Hirschman, 1982).

Some consumer psychologists in the 1980’s began to question the applicability of IP to certain consumption phenomena such as playful leisure activities (e.g., gambling), sports, and arts. They propose a perspective appropriate to the study of experiential consumption and term it the “hedonic approach” (Hirschman & Holbrook,

1982; Holbrook et al., 1984). For instance, Holbrook et al. (1984) argue that there is a need to distinguish consuming, using, and product involvement from buying, choosing, and purchase. Contrary to the IP paradigm, research on hedonic consumption emphasizes symbolic benefits, emotions and feelings, sensory arousal, and aesthetic mentality. Further, while the IP paradigm focuses on general consumer characteristics such as demographics and socio-economic status, the hedonic paradigm emphasizes experientially relevant personalities such as SS, variety seeking and religious world view (Holbrook & Hirschman, 1982).

The origins of the hedonic consumption paradigm are in several behavioral sciences, such as aesthetics in philosophy, emotional response in psycholinguistics, and motivation and imagery studies in psychology (Hirschman & Holbrook, 1982). Hirschman and Holbrook (1982, p. 92) define hedonic consumption as “a system of consumer behavior that relates to multi-sensory, fantasy-producing, and emotive aspects of product-usage experience.” The hedonic approach focuses on emotional responses, sensory pleasure, aesthetic enjoyment, and fantasy/daydreams, while researchers in hedonic studies explore previously neglected consumption contexts, including playful leisure activities such as play, art, entertainment, and sport, as well as gambling (Hirschman & Holbrook, 1982; Titz et al., 2002; Wakefield & Barnes, 1996).

Holbrook et al. (1984) suggest that emotion is one of the most important aspects in play and leisure activities, such as playing computer games. They also report that personality (i.e., visualization vs. verbalization) and its congruity with video game design, performance, and perceived complexity all influence emotional

responses. Likewise, other researchers also support the importance of emotion, by suggesting that gambling provides people with various emotions, such as excitement and enjoyment (Caffray and Schneider, 2000; Caron & Ladouceur, 2003; Coups, Haddock, & Webley, 1998; Ladouceur, 2004; Titz et al., 2002). While Holbrook et al. (1984) investigate the interface of personality, computer game performance and emotions, their study did not examine the influence of sensory arousal and individual's need for stimulation in the above context, which are also important aspects in playful leisure activities, according to the hedonic paradigm (Hirschman & Holbrook, 1982). Given that studies suggest gambling participation elevates levels of sensory arousal (Coventry & Norman, 1997; Coventry & Constable, 1999; Leary & Dickerson, 1985; Meyer et al., 2000), it might be fruitful to replicate and extend Holbrook et al. (1984) in order to examine computer-mediated gambling forms.

In sum, the majority of research on gambling does not take a consumer behavior perspective, while taking a public health approach which focuses on pathological gamblers and their behaviors (Dickerson & Baron, 2000). Consequently, gamblers various emotional states during gambling activities have not been fully examined to date (Titz et al., 2002). Thus, the hedonic consumption paradigm may broaden our understanding on gambling behaviors, since it allows researchers to investigate the relationship between individual's need for stimulation and emotion, as both concepts are known to be the essence of playful leisure activities such as gaming (Holbrook & Hirschman, 1982; Holbrook et al., 1984). Based on the hedonic paradigm, the current study attempts to build upon Holbrook et al. (1984) by investigating the potential moderating influence of OSL-based personality (SS) on

features (visual stimuli) of a computer-mediated (slot machine) game, with regards to consumers' (social gamblers) emotions.

2.1.2. OSL Theory

Hebb (1949) proposed the concept of OSL in the 1940s. The concept is also evidenced in several sensory deprivation experiments such as Hull's work in the 1950s and Zuckerman's research in the 1970s. Scientific theories originating from the OSL paradigm, include Zuckerman's (1979, 1994) notion that OSL is the basis of personality. Related to initial conceptions of OSL is the notion of arousal theory, which states that every individual has a characteristic OSL. In general, OSL works to structure individual personality, as people try to seek or reduce stimulation to maintain certain levels of arousal (Raju, 1980; Zuckerman 1988, 1994).

OSL theory suggests that the relationship between stimulation and a person's reaction to stimulation follows an inverted U-shaped pattern with an intermediate level of arousal providing people with the most positive emotion (Berlyne, 1960; Steenkamp & Baumgartner, 1992; Zuckerman, 1994). In order to maintain a certain level of arousal, individuals interact with their environment and attempt to adjust stimulation to their specific requirements for each environment. For example, people seek excitement when they are under-stimulated and try to reduce their arousal level when they are over-stimulated. Raju (1980) suggests that OSL is a property that defines individual response to environmental stimuli and the latter has unique arousal potential determined by novelty, intensity, and complexity. He also contends that arousal potential represents the power of a stimulus to excite the nervous system, to create attention, and to influence behavior. Zuckerman (1994, p. 17-18) argues that the

following factors determine an individual's OSL: constitutional factors, age, learning experience, recent levels of stimulation, task demands, and diurnal cycles.

There are several self-report OSL measures. For example, Mehrabian and Russell's (1973) Arousal-Seeking Tendency (AST) inventory gauges a person's preferred arousal level. The Change-Seeking Index (CSI) measures the "need for variation in one's stimulus input in order to maintain optimal functioning" (Garlington & Shimota, 1964, p. 919). SS, as evaluated by the SSS Form V, assesses an "individual's need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences" (Zuckerman, 1994, p. 27). The Novelty Experience Scale (NES) measures a person's "tendency to approach versus a tendency to avoid novel experiences" (Pearson, 1970, p. 1999).

Among OSL measures, it is noted in the psychology literature that SS scales are among the most applied in OSL research (Roberti, 2004). Further, SS scales are reported to be reliable and valid measures of OSL (Deditius-Island & Caruso, 2002; Haynes, Miles, & Clements, 2000; Zuckerman, 1994). For example, Zuckerman (1994) suggests that internal reliabilities of the SSS Form V ranged from .83 to .86. Wahlers and Etzel (1990) compare the internal structure of an SS model and an AST model by using a causal modeling approach and report that SS (having a Goodness of Fit Index = .88) is a better operationalization of OSL than AST (having a Goodness of Fit Index = .86), and further that SS is a conceptually and empirically well-specified measure of OSL.

2.1.3. Overview and Development of SS

Marvin Zuckerman's work on SS began in the 1960s and was instigated by evidence of consistent individual differences in OSL (Zuckerman, 1994). According to Zuckerman (1994), SS is a personality trait evidenced by the measure of an individual's OSL: HSS individuals have higher OSL thresholds than those who score lower on measures of the trait. Zuckerman concludes that SS is a personality factor with several biological correlates and a high heritability (Zuckerman, 1994). His study on twins (1974) provides evidence for his hypothesis that SS is biologically based in personality. His early work attempts to identify a general trait for all sensory modalities (Zuckerman, Kolin, Price, & Zoob, 1964); however, subsequent studies reveal several subfactors, suggesting that the stimulation factors are not modality specific (Zuckerman, 1971). That is, sensory stimulation is channeled through various modes, including the mind, the senses, social interactions, or risky activities, and each mode affects stimulation levels. Through factor analysis, Zuckerman (in Zuckerman, 1994) identified four subfactors: Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (DIS), and Boredom Susceptibility (BS).

According to Zuckerman (1994), various measures of the SS trait have evolved over the years. The first two scales, SSS Form I and Form II, were developed in the early 1960s, and those scales attempted to assess a single general trait of SS. However, a subsequent study by Zuckerman and Link (1968) reports that SS is composed of multidimensional factors. However, Form I and Form II did not clearly represent the four dimensional factors, and thus Zuckerman (1971) offers a 72- item SSS Form IV, which involves four factors. SSS Form V, a modified version of SSS IV, includes

improvements in discriminant validity, increased cross-cultural and cross-gender reliability, and a shorter number of test items (reduced from 72 to 40 items).

SSS Form V derives a total score from the sum of the scores from each of the four subscales. It involves a forced-choice format to control social desirability and acquiescence (Zuckerman, 1994). Further, tests in several countries including England, Australia, and Canada help support the reliability of SSS Form V and it has been translated into several languages such as Hebrew (Birenbaum, 1986), Swedish (Bjorck-Akesson, 1990), Chinese (Wang, We, Peng, Lu, Yu, Wang, Fu, & Wang, 2000), Thai (Berkowitz, 1967), Polish (Oleszkiewicz, 1985), and Japanese (Terasaki, Shioni, Kishimoto, & Hiraoka, 1987).

While SSS Form V is the most popular measure of SS, there are also recent attempts to modify this measurement instrument to facilitate its use in different research contexts. For example, there is a shorter SSS, developed to lessen completion time for responses, as well as a true-false form devised for experimental studies (Zuckerman, 1994). Additionally, there is an SSS Form V for children, since some items in the original SSS Form V are not suitable for young subjects (Russo, Stokes, Lahey, & Christ, 1993).

Using factor analysis, Zuckerman, Kuhlman, Thornquist, and Kiers (1991) develop an alternative five-factor model consisting of the four subscales from SS and several measures of impulsivity; they term it Impulsive Sensation Seeking (ImpSS). ImpSS is a reliable and valid alternative to the commonly used 40-item SSS Form V. It is a part of a broader five-factor personality model of the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ), which includes Neuroticism-Anxiety (N-Anx),

Aggression-Hostility (Agg-Hos), Activity, and Sociability, as well as ImpSS (Zuckerman, Kuhlman, & Camac, 1988; Zuckerman et al., 1993). ImpSS, a true-false scale, is composed of 11 items measuring SS and 8 items assessing impulsivity; its compound nature relies on evidence that impulsivity and SS share behavioral and biological correlates (Zuckerman et al., 1993). Of the 11 SS items, 8 items are from SSS Form V; 4 from the ES, 2 from the DIS, 1 from the TAS and 1 from the BS (Zuckerman, 1994).

Research supports the notion that SS is associated with impulsivity (Breen & Zuckerman, 1999; Jack & Ronan, 1998; Whiteside & Lynam, 2001; Zuckerman, 1994; Zuckerman et al., 1991). Previous studies also suggest that impulsivity is an important psychological factor influencing gambling behaviors (Barnes, Welte, Hoffman, & Dintcheff, 1999; Lightsey & Hulsey, 2002; McDaniel & Zuckerman, 2003; Petry, 2001; Steel & Blaszczynski, 1998; Vitaro, Ferland, Jacques, & Ladouceur, 1998). While the “measures of SS may be associated with risk-taking behaviors that are often carefully planned to minimize physical danger, impulsivity measures may capture more of a lack of planning or underestimation of risk” (Breen & Zuckerman, 1999, p. 1100). Thus, when SS is integrated with impulsiveness, it produces a broader trait called “Impulsive Sensation Seeking” (ImpSS) (Breen & Zuckerman, 1999; Zuckerman, 1994; Zuckerman et al., 1991, 1993).

While SSS Form V has been widely used in psychology and other fields, some researchers argue that it has certain psychometric limitations as an OSL measure. These include its forced-choice format, length, culturally biased items, and other measurement shortcomings (Arnett, 1994; Haynes et al., 2000). Other studies note

advantages in using ImpSS, such as its generality and its descriptions of non-specific activities, which are less confusing than the SSS Form V (Zuckerman, 1994; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). The following passage addresses the application of SS theory to gambling research.

2.2. General Overview of Personality and Gambling Research

2.2.1. The Relationship between SS and Risk-Taking

Zuckerman (1994) indicates that risks can be physical, legal, financial, or social. One form of financial risk-taking with uncertain outcomes and possible monetary loss is gambling. HSS individuals tend to engage in risky behaviors, including gambling (drug use and unsafe sex), subsequently increasing their levels of stimulation to maintain their OSL (Zuckerman, 1994; Zuckerman & Kuhlman, 2000).

Zuckerman (1994) provides theoretical explanations for the relationship between SS and risk-taking of the kind found in gambling activities. According to his model, anxiety is directly and positively related to a level of appraised risk, while SS is inversely related to a level of appraised risk (that is, it shows an inverted U-shape), depending on the novelty of the situation and the individual's OSL. Given the correlations between SS and appraised risk, there are two separate, possible trends in individual responses: approach tendency and avoidance tendency (Zuckerman, 1994). These two tendencies are functions of differential strengths in drive and varying appraisals of risk. The approach tendencies are strongest at the optimal level of arousal. People have avoidance tendencies when anxiety exceeds SS and produces a decline in the level of arousal. Zuckerman also notes that HSS and low sensation seeking (LSS) individuals differ in terms of gradients of anxiety and OSL, indicating that LSS

individuals have lower anxiety thresholds and achieve optimal levels of arousal sooner than HSS individuals (Zuckerman, 1994).

There is plenty of evidence supporting a positive relationship between an individual's level of SS and a capacity for risk-taking (Jack & Ronan, 1998; Roberti, 2004; Zuckerman, 1994). For example, Jack and Ronan (1998) argue that there is a significant difference between HSS and LSS individuals in preference for sports. They find that hang gliders, mountaineers, sky divers, and automobile racers score significantly higher for total SS and higher for all four SS subtraits than low sensation sports participants such as swimmers, marathon runners, aerobic exercisers, and golfers. Zuckerman and Kuhlman (2000) indicate that SS is positively related to various risk-taking activities, such as drinking, smoking, drug use, and sex. These findings are consistent with other studies (Lejuez et al., 2002; Roberti, 2004; Rolison & Scherman, 2003). For instance, Rolison and Scherman (2003) indicate that SS, along with perceived peer participation and perceived benefits is a valid predictor of involvement in risk-taking activities. Likewise, Lejuez et al., (2002) results suggest that SS scores positively relate to drinking, drug use, gambling, and sex. In their study, Lejuez et al. (2002) also introduce the Balloon Analogue Risk Task (BART), which is a computerized behavioral measure of general risk-taking tendencies. They find that total BART scores are positively related to total SS, as well as to a Barratt Impulsiveness score.

2.2.2. SS and Gambling

As mentioned earlier, gambling is a risk-taking activity with uncertainty of outcome and possible monetary loss (McDaniel & Zuckerman, 2003; Zuckerman,

1994; Zuckerman & Kuhlman, 2000). Given that risk-taking activities provide people with stimulation and arousal, HSS individuals are more likely to be involved in gambling activities (Zuckerman, 1979; Zuckerman & Kuhlman, 2000). Zuckerman (1979) suggests a relationship between SS and gambling in which “individuals entertain the risk of monetary loss for the positive reinforcement produced by states of high arousal during the periods of uncertainty, as well as the positive arousal produced by winning” (Zuckerman, 1979, p. 211).

The above notion is also supported by studies showing that gambling serves the function of arousal reinforcement (Anderson & Brown, 1984; Coventry & Constable, 1999; Coventry & Norman, 1997). While there is theoretical support for the relationship between gambling and SS, some experimental studies report contradictory results. For example, Anderson and Brown find a positive relationship between SS and bet size. Likewise, Dickerson et al. (1987) examine the relationship between SS and gambling behaviors, suggesting that the SS subscales of experience seeking (ES) and disinhibition (DIS) correlate sensation levels with involvement in betting, while the subscale of boredom susceptibility (BS) is related with arousal. Wolfgang’s (1998) results indicate that SS is positively related with a future intention to gamble (Wolfgang, 1988). Coventry and Brown (1993) find that, compared to the general population, off-course bettors display a lower score on the SS scale, and that HSS individuals prefer racetracks and casinos. They also indicate that HSS individuals are involved with more varied forms of gambling.

Conversely, a few studies fail to find SS to be a significant influence on gambling behaviors (cf. Blaszczynski, Wilson, & McConaghy, 1986; Dickerson et al.,

1990). According to Breen and Zuckerman (1999), failures to find a linkage could be due to methodological problems such as the failure to control for age or the type of gambling. It should also be noted that some studies that fail to find correlations between SS and gambling did not consider the variance in dynamics of different types of gambling activities (McDaniel & Zuckerman, 2003).

Dickerson and Baron (2000) suggest that since traditional SS studies on gambling are not supported by some research, future studies need to employ modified versions of the SS scale (e.g., ImpSS). While most gambling research on SS utilizes the SSS Form V, some recent studies employ the newer ImpSS scale. For example, Breen and Zuckerman (1999) find a small but significant correlation between gambling, as measured on the Gambling Attitudes and Beliefs Scale (GABS), and both the impulsivity and SS subscales of the ImpSS. In a later study, McDaniel and Zuckerman (2003) investigate the relationship between ImpSS and gambling behaviors using a community sample of adults from two major metropolitan areas. Their survey results indicate that ImpSS and its subscales (SS and Imp) are differentially related to gambling interest and gambling behavior for across gambling forms. The above results suggest that different types of gambling stimuli might provide different levels of enjoyment and arousal (Dickerson, 1993)

2.2.3. Gambling and Emotion

Gambling is a form of hedonic consumption, and thus by definition, emotion is an inherent part of such activities. There has been increasing levels of attention to the study of emotion in various types of experiential consumption, such as media, leisure, and sport (Hirschman & Holbrook, 1982; Wakefield & Barnes, 1996). As

illustrated below, there is often no common agreement on a definition of emotion, affect, or mood; researchers disagree on the extent to which emotion is a physical or a mental experience. One view holds that emotion is physiological in nature, but also acknowledges that emotion is instigated by mental processes. For example, Bagozzi, Gopinath and Nyer (1999) offer a useful explanation of the physical expressions of psychologically experienced emotion, describing emotion as “a mental state of readiness that arises from cognitive appraisals of events and thoughts; has a phenomenological tone; is accompanied by physiological processes; is often expressed physically; and may result in specific actions to affirm or cope with the emotion depending on its nature and meaning for the person having it” (p. 184). Similarly, O’Shaughnessy (1992) emphasizes physiological results of mental processes, defining emotion as “a mental state, periodic or dispositional, associated with certain physiological conditions, and brought about by thoughts and happenings perceived as highly desirable or highly undesirable” (p. 179).

Other studies emphasize the physical experience and de-emphasize cognitive involvement, reducing it to a process of naming the emotion; these studies focus on attempting to explain the relationship between arousal and emotion. For example, Shachter and Singer (1962) argue that arousal is an important part of emotion, indicating that it is a combination of bodily arousal and cognitive labels for an individual’s felt arousal. Likewise, Bagozzi et al., (1999) contend that arousal is a bodily detected sensation, interpreted by people as emotional experience. Still other researchers define emotion as a wholly physical experience. For example, Zajonc and Markus (1982) suggest that emotion can be produced without any cognitive process.

They propose a theory of exposure, which suggests that repetitive exposure to stimuli influences an individual's attitude. However, most research in this area is confined to stimulation that includes shapes (polygons), sounds, Chinese letters, and nonsense syllables.

Despite differences in the definitions of emotion and its effect on arousal, gambling is generally thought to provide people with both emotional excitement and sensory arousal (Anderson & Brown, 1986; Dickerson et al., 1992; Hills, Hill, Mamone, & Dickerson, 2001) and physiological arousal (Anderson & Brown, 1984; Leary & Dickerson, 1985; Sharpe et al., 1995). Leary and Dickerson (1985) find a significant relationship between gambling and the elevation of subjective excitement. Likewise, Coventry and Constable (1999) indicate that participation in gambling provides heart rate change as well as subjective excitement during playing. They also point out that not all forms of gambling are arousing, suggesting that there is heterogeneity in gambling, in terms of arousal potential.

Studies find that risky behaviors are often associated with emotion (Zuckerman, 1994). Caffray and Schneider (2000) propose that affective states are a primary motivational factor for participation in risk-taking activity, such as drinking alcohol, using drugs, and smoking cigarettes. Similarly, gambling is a form of risk-taking activity, which has uncertain outcomes and possible monetary loss (Zuckerman, 1994); research suggests that affective motivators associated with risky behaviors enhance pleasant affective states (e.g., SS), reduce negative affective states (e.g., tension or anxiety), and avoid anticipated regret (Caffray & Schneider, 2000). Caffray and Schneider also argue that an individual's level of experience in risky activities

influences affective motivators: the primary affective motivator of the low-experience group is avoiding negative outcomes, while the primary affective motivator of the high-experience group involves risk-taking to achieve positive emotion (e.g., excitement and pleasure). The current study employs the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) to identify and, thus, exclude pathological and non-gamblers in an attempt to account for each subject's level of experience in slot-machine play and to respond to calls for investigation of social gambling (Dickerson & Baron, 2000). While SOGS is one of the most common tools for identifying pathological gamblers, it may also prove fruitful for future gambling studies in terms of stratifying social gambling samples.

Anderson and Brown (1986) apply "reversal theory" to the study of gambling and emotions. This theory suggests generally that a gambler's emotions are affected by his or her attitudes towards the purpose of play. The purpose of play falls into two specific meta-motivational states: telic states and paratelic states (Apter, 1982). People switch from one meta-motivational state to another in accordance with their situation, and this alteration influences gamblers' attitudes, or their hedonic tone, toward gambling. A telic state is goal-directed, while a paratelic state persists, focusing on continuing a behavior and its related sensations. Reversal theory proposes that people experience pleasure and prefer states of high intensity and high arousal in paratelic (continuing) states. Anderson and Brown also contend that people experience high arousal as a more pleasant state of excitement during gambling activity, that winning and losing affect gamblers' hedonic tone (attitudes), and that people experience rapid switches from telic (goal-oriented) to paratelic (continuing) states during play. They

further suggest that people in a paratelic but low-arousal state of boredom seek gambling to elevate their arousal level and that an exit from gambling should be interpreted as a switch from a paratelic state to a telic state.

Related to the variance in hedonic attitudes between goal-orientation and persistence, some studies focus on the relationship between gambling and mood. For example, Hills and Dickerson (2002) suggest that mood influences gambling persistence. They find that negative moods have inhibitory effects on gaming persistence for non-gamblers but not for regular gamblers, indicating that regular gamblers gamble regardless of their mood. They also report that subjects pursue excitement from gambling experiences and that both the expectation of winning and the experience of play produce elation. Ricketts and Mackaskill (2003) argue that people use gambling as a means of emotional management, indicating that individuals gamble to moderate emotional discomfort by distracting themselves from unpleasant emotions or thoughts. In related research, Lightsey and Hulsey (2002) indicate that emotional coping, along with impulsiveness and task coping, influences gambling behaviors. Griffiths (1995) compares regular and pathological gamblers, suggesting that both groups experience depressive moods prior to gambling, while pathological gamblers experience more excitement during gambling.

Although emotion plays an important role in gambling, most studies on emotion during gambling participation focus on one or two specific emotions such as subjective arousal, excitement, and enjoyment (cf. Leary & Dickerson, 1985; Anderson & Brown, 1986; Coventry & Constable, 1999; Meyer et al., 2000). As a result, a dimensional emotion approach may broaden our understanding of gamblers'

emotional responses, since it could provide a general description of emotions (Mehrabian, 1995). One of the most common dimensional emotion approaches is the Pleasure-Arousal-Dominance (PAD) paradigm, which is supposed to explain a full range of human emotions (Havlena & Holbrook, 1986). PAD is argued to be suitable to assess one's emotional responses to intrinsically motivated activities (Holbrook et al., 1984). Further, PAD scales are also designed to measure emotional responses to environmental stimuli, such as images (Richins, 1997). This suggests PAD may be a suitable approach to gauge emotional response to visual stimuli in certain gambling forms.

The PAD is a dimensional emotion model which contains three factors: pleasure-displeasure (P), arousal-nonarousal (A), and dominance-submissiveness (D). According to Mehrabian (1998), the pleasure (P) dimension describes directionality of affective states (e.g., positive vs. negative affect). The arousal (A) dimension expresses the combination of mental alertness and physical activity. Conversely, the Dominance (D) dimension depicts levels of control over events, one's surroundings, or other people. Given that all three dimensions explain different aspects of emotional states, and given the neglect of D in previous studies, the current study attempts to add to the body of gambling literature by including D dimensions (cf Titz et al., 2002). Further, given that the sense of control during gambling is biased, the information on D dimension may help explain other cognitive constructs known to influence gambling behaviors, such as illusion of control (Langer, 1975; Dixon, 2000), irrational thinking (Delfabbro & Winfield, 2000), and cognitive bias (Ladouceur, 2004; Hong & Chiu, 2001).

2.2.4. Gambling and Arousal

While there are three dimensions in emotions, including pleasure, arousal, and dominance (Mehrabian, 1995), most previous gambling studies focus on arousal. For instance, the notion that gambling provides psychological arousal is supported by several experimental studies, indicating that people experience elevated levels of arousal from gambling participation (Anderson & Brown, 1984; Coventry & Constable, 1999; Coventry & Norman, 1997; Leary & Dickerson, 1985; Meyer et al., 2000; Sharpe et al., 1995). Anderson and Brown (1984) find that participation in gambling activity produces increased arousal, measured by heart-rate level, in real casino conditions, while related gambling activities in artificial conditions produce no significant increase in arousal.

Leary and Dickerson (1985) utilize an experimental design which separates high-frequency gamblers from low-frequency gamblers, using both physical (heartrate; HR) and subjective measurements, by asking subjects to use their own money, thus elevating the level-of-risk element. They indicate that while there is no significant difference in baseline HR between the two groups, regular players experience a greater increase of HR than low-frequency gamblers. However, other studies fail to confirm the assumption that there is a difference in HR change between high- and low-frequency gamblers; although, they support the notion that gambling provided people with elevated arousal levels (cf. Coventry & Norman, 1997; Griffiths, 1993). Meyer et al. (2000) extend Anderson and Brown's study, measuring arousal, not only by HR, but also by taking measures of salivary cortisol to examine stress hormone secretion. Their findings are consistent with Anderson and Brown (1984); they report a

significant difference treatment and control groups, in terms of both HR change and cortisol levels.

To date, there is considerable evidence showing elevated arousal levels during gambling across different forms of gambling. For example, several forms of gambling produce heightened levels of arousal, including blackjack (Anderson & Brown, 1984; Meyer et al., 2000), poker machines (Dickerson, Hinchy, England, Fabre, & Cunningham, 1992; Dickerson & Adcock, 1987; Leary & Dickerson, 1985), fruit-machine gambling (Coventry & Constable, 1994; Coventry & Hudson, 2001), video-taped horse racing (Sharpe et al., 1995), off-course horse racing (Coventry & Norman, 1997; Dickerson et al., 1987), video lottery games (Ladouceur, Sevigny, Blaszczynski, O'Connor, & Lavoie, 2003), and computer-generated gambling tasks (Coventry & Norman, 1998).

While there is support for the notion that gambling activities produce excitement and arousal, researchers often apply different paradigms to study the role of arousal and its relation to gambling behavior. For example, Dickerson (1977) employs an operant model that examines why people continue to bet again and again, even when losing. McConaghy (1980) uses a drive-reduction model, suggesting that gambling behaviors must be completed in order to reduce unpleasant sensations from heightened arousal. Anderson and Brown (1986) examine gambling behaviors based on a classical/Pavlovian model, arguing that the nervous system is associated with the conditioning processes, thus explaining the reinstatement phenomenon that results in continuing and repetitious gambling behaviors.

Sharpe et al. (1995) utilize an experimental design based on a cognitive behavioral model, which posits that cognitive events play important roles as either internal triggers or as interpreters of external cues for the maintenance of arousal levels. Their findings suggest that, while arousal and cognition both influence gambling behaviors such as addiction, arousal produced by participation in gambling activities is mediated by subjects' cognitive processes (such as distraction).

In contrast, other studies suggest the OSL theory is a basis of gambling behaviors in which participation in gambling serves as a psychological mechanism to maintain the level of arousal, thus explaining why individual differences influence gamblers' preferences for and interests in certain forms of gambling (Coventry & Brown, 1993; McDaniel & Zuckerman, 2003; Wolfgang, 1988; Zuckerman, 1994).

There are also attempts to identify factors associated with increases or decreases in arousal levels during gambling. For example, Anderson and Brown (1984) find that bet size is positively related to level of arousal. This is supported by other studies (cf. Leary & Dickerson, 1985; Meyer et al., 2000), which indicate that the level-of-risk element is related to the arousal produced during gambling. Some research suggests that arousal can be produced without any motor activity (Anderson & Brown, 1984).

Dickerson and Adcock (1987) identify several factors related to the duration of arousal. They report that the total number of plays is significantly related to the duration of arousal in both low-frequency and regular players, while persistence of play is related to duration of arousal only in regular players. The study also indicates that subjects, who decided to play longer than the time required by the experiment,

showed more excitement. It is also found that the cognitive processes are sources of arousal (Sharpe et al., 1995).

Walters and Contri (1998) equate expectancy for positive gambling outcomes with a participant's change in arousal levels. Likewise, Ladouceur et al. (2003) indicate that winning expectancy is a primary motivational factor for gambling and that the mere expectancy of winning, not the game itself, is the main source of arousal and excitement. They find that subjects in high-winning expectancy conditions experience faster HR increases than those in low-expectancy groups.

Some research suggests that winning is significantly more arousing than losing in random conditions, while winning is less arousing in descending conditions where subjects lose more than they win. This is particularly true at the end of gambling tasks (Coventry & Norman, 1998). Consistent with Ladouceur et al. (2003), Coventry and Hudson (2001) report that subjects playing fruit machines show elevated HR levels, that winning is a significant predictor of arousal change, and that males and females show similar HR changes.

While some researchers question the ecological validity of laboratory-based gambling research (Anderson & Brown, 1984), others contend that valid and reliable measurement of the relationship between arousal and gambling is possible in such settings (Leary & Dickerson, 1985; Meyer et al., 2000). For example, Leary and Dickerson (1985) report that high-frequency gamblers experience a significantly greater increase in HR and subjective arousal than low-frequency players; although, the HR increases for the latter group were also significant. Likewise, Meyer et al. (2000) find that gambling in laboratory settings can result in significant changes in

level of arousal when risk is elevated (e.g., using participants' own money). Their experimental design involves one group playing blackjack with their own money and a control condition where other subjects played the same game with merely an accumulation of points. The study finds a notable change in arousal levels in both conditions.

2.3. General Overview of Gambling Studies

2.3.1. Heterogeneity of Gambling Forms

Some gambling scholars argue that one of the methodological and conceptual problems in gambling research is the failure to consider the heterogeneity of gambling forms (Aasved, 2002; Breen & Zimmerman, 2002; Dickerson, 1993; McDaniel & Zuckerman, 2003; Walker, 1992). For example, Walker (1992) suggests that each form of gambling can be located on a luck-skill continuum: the outcome of skill-based gambling (e.g., card games and sports betting) is determined by strategic play controlled by gamblers, while luck-based gambling, such as slot machines, bingo, and lotteries, is largely based on pure chance. Likewise, Krober (1992) finds different subjective experiences between roulette gamblers and electronic-machine gamblers at various levels: demographics, behaviors (e.g., antisocial behaviors), psychological characteristics (such as depression), reactive disorders, and personality disorders (e.g., narcissistic and cyclothymic patterns).

Dickerson (1993) suggests the heterogeneity of gambling forms is an important consideration:

Given the very different stimulus and temporal characteristics of the different forms such an assumption, that psychological processes in

different forms of gambling arises in similar fashion, has poor face validity. It is further undermined by the fact that some gamblers use one form exclusively. In our research we have found it useful to discriminate between what we have called continuous and discontinuous forms. This distinction may have important considerations for treatment and the maintenance of controlled gambling. To assume that gambling is a homogeneous set of behaviors may be counterproductive, as a detailed consideration of the different characteristics of different forms may permit the identification of the unique ways in which stimulus conditions and gambler responses may combine to cause impaired control (Dickerson, 1993, p.226).

Dickerson (1993) further argues that gambling forms can be characterized by several dimensions, including continuity, dimension of skill, and situational factors, such as timing, stake size, and the presence of non-gambling stimuli. He also suggests that people have unique subjective experiences according to their relationship with the machine, the croupier, and their opponents. Griffiths (1999) shares a similar view to Dickerson's, in characterizing slot machines and card games as "hard-gambling," because of their greater potential risk as a function of rapid staking/play, when compared to "soft gambling" forms, such as lottery and sport wagering.

Breen and Zimmerman (2002) posit that machine gambling is more user-friendly and play is shorter, making it a substantially different form of gambling from card games and sports betting. Gamblers also have different experiences in terms of

visual stimuli, repetition of betting outcomes, withdrawal into one's world, and sound (Breen & Zimmerman, 2002; Dowling et al., 2005).

Aasved (2002) argues that, in spite of a lack of empirical support on the relationship between SS and gambling (as noted by Dickerson & Baron, 2000), individuals respond to each form of gambling differently since they are attracted to certain types of gambling that fulfill their specific emotional needs. However, there has been little attempt to date, to experimentally examine the individual's responses to the features of gambling forms (Dowling et al., 2005).

McDaniel and Zuckerman (2003) argue that various forms of gambling exist, ranging from legal to illegal, from mundane (e.g., playing cards with friends) to spectacular (e.g., casino gambling). They also contend that it is crucial to gambling research to take the heterogeneity of forms into consideration, since each gambling type, such as casino gambling (e.g., card games, slot machines, and roulette), lottery tickets, pari-mutuels, as well as betting on sporting events, provides gamblers with a different experience and each represents a different degree of arousal potential.

These studies and others help to underscore the importance of considering heterogeneity in gambling to SS research in this area. For example, Coventry and Brown (1993) find that preferences for certain forms of gambling is different for high and LSS individuals, arguing that off-course bettors scored lower on SSS, while casino or race-track gamblers scored higher on SSS Form V. Breen and Zuckerman (1999) also suggest that there is a difference in psychological dynamics between passive gamblers and active gamblers, in which HSS individuals prefer more active forms of gambling.

In a similar work, Titz et al. (2002) investigate the difference between mechanical game players and table-game players in terms of SS, impulsivity, PAD, and absorbing behaviors. They find that subjects playing machines are less involved with the game and less analytical in play, while table gamblers are more likely to be absorbed during gambling, demonstrating a higher level of analytical behaviors such as studying the game and keeping track of odds. However, their data did not support significant differences in SS and emotion between mechanical gamblers and table-game players, while both types of players experience increased levels of pleasure, regardless of the SS levels. Further, they find that slot-machine players are less likely to be aroused than table-game players, while the latter are more inclined to experience fright and other arousing emotions.

Petry (2003) also argues that different forms of gambling provide gamblers with different levels of excitement, and thus certain forms of gambling might be better suited to the application of SS theory. For example, he hypothesizes that bettors on horse races and other sports should experience physiological excitement, such as increases in heart rate and blood pressure, and therefore HSS individuals seek out these kinds of gambling activities. In contrast, he suggests that SS and impulsivity may be less correlated to card games since such games require more cognitive focus.

While there is considerable evidence that HSS individuals have different preferences for and interests in certain forms of gambling, and while it is likely that each gambling form possesses a unique level of arousal potential (Coventry & Brown, 1993; McDaniel & Zuckerman; 2003, Wolfgang, 1988; Zuckerman 1994), there is a need to experimentally examine how environmental factors (e.g., game features) might

interact with personality (e.g., SS) to influence gambling behaviors (e.g., emotional responses). Furthermore, there is some agreement on the notion of heterogeneity of gambling, there have been few attempts to examine potential differences in gambling forms with experimental design (Dickerson & Baron, 2000). Based on OSL theory and previous studies on gambling and SS, it is reasonable to assume that certain features in each type of gambling are more responsible for sensory arousal and emotional states during gambling participation (Dowling et al., 2005; Griffiths, 1999). Further, little is known about the effects of those features on gamblers' emotional responses to date (cf. Anderson & Brown, 1986; Dickerson et al., 1992; Hills, Hill, Mamone, & Dickerson, 2001; Ricketts and Mackaskill, 2003). Thus, the current study will endeavor to investigate the effects of visual stimulation on emotional responses in terms of need for stimulation.

2.3.2. Structural Characteristics of Slot Machines

As mentioned earlier, each form of gambling is different in nature in terms of sensory stimulation (Breen & Zuckerman, 1999; Dickerson, 1993; Griffiths, 1999; McDaniel & Zuckerman, 2003; Petry, 2003). Some go so far as to argue that each form of gambling represents a different level of potential for addictive behavior (Dowling et al., 2005). Dowling et al. (2005, p. 33) contend that, among other forms of gambling, machine gambling, including slot machines, is one of the most addictive forms of gambling, one often argued to be the 'crack-cocaine' of gambling.

While studies in other areas of addiction investigate the addictive characteristics of tobacco and other substances, there have been only a few studies examining the influence of specific features of slot machines, such as reel speed,

sound effects, visual complexity and play interval, which researchers argue contribute to their potential addictiveness (Loba et al., 2002; Griffiths, 1993; Sharpe et al., 2005). Moreover, there is a need to examine gamblers' responses to those characteristics of slot machines, which may in turn provide the information necessary to help decrease harmful behavior, such as addiction. For instance, Griffiths (1993) suggests several harm-minimization strategies, relative to those features, that can be applied to the design of slot machines such as limited use of sensory features (i.e. audiovisual effects), the sounds of plastic pay out trays versus metal ones, and visual information on payout rates and win probability (Griffiths, 1993).

Griffiths (1993, 1999) provides an overview of various characteristics of slot machines and divided those features into two categories: situational and structural characteristics. Situational characteristics are environmental features such as the location of the gambling outlet, the number of gambling outlets, and the use of advertising, all of which are associated with initial decision making on gambling (Griffiths, 1999). Structural characteristics are features inherent in gambling technology, which are relative to acquisition, reinforcement, development, maintenance of excessive gambling (Griffiths, 1999).

Slot machines contain more structural characteristics than any other form of gambling, given that this game is inherently incorporates technology (Dowling et al., 2005). The structural characteristics of slot machines include: multiplier potential, rapid speed of play, multiple coin and note acceptors, credited wins, reinforcing payout schedules, and audiovisual effects (Griffiths, 1993). Griffiths (1995) argues that slot machine playing involves the psycho-structural interaction between gamblers

and machines, and thus an analytical approach focusing on its structural aspects provides a context-specific explanation for a greater tendency for the gambling form to foster addiction rather than global explanations such as the addictive personality of gamblers.

Audiovisual effects are important structural characteristics of the slot machine, as they are related to sensory arousal (Dowling et al., 2005; Griffiths, 1995). Auditory effects include the sound of the reel rotation and coins falling into metal trays, and musical tunes and buzzers, while visual stimulation includes lighting, ambience, color, and the iconography in games (Griffiths, 1999). Gambling researchers contend that those audiovisual effects produce continual fun, provide the impression that winning is more common than losing, and facilitate the availability bias (i.e., winning is more common) (Dowling et al., 2005; Griffiths, 1993).

Although these sensory factors are often mentioned as being influential in the formation of gambling behaviors, there are few studies that examine the potential impact of manipulating sensory stimulation features of slot machines on gamblers (cf. Christopherson & Weatherly, 2006; Ladouceur & Sevigny, 2002; Loba et al., 2002). For instance, Loba et al. (2002) find that sensory features (i.e., reel speed and sound) influence gamblers' preference for playing Video Lottery Games (VLT). They also report that other structural characteristics, including counters and stop buttons, influence study participants' gambling behaviors, while, among other structural characteristics, sensory features (i.e., sound and reel speed) have the greatest influence on ratings of enjoyment, excitement, and tension-reduction for pathological gamblers.

Likewise, Ladouceur and Sevigny (2002) find that modalities of symbol presentation (i.e., all reels stopping at once vs. stopping sequentially) increases the number of plays, whereas the perception of winning and near wins is not significantly related to the number of plays. They also call for research examining how visual stimulation influences gamblers' emotion and arousal, given that the latter is associated with gambling persistence. Christopherson and Weatherly (2006) examine the influence of total number of symbols appearing on the screen on certain gambling behaviors such as number of trials. Despite not finding significant relationships, they argue that expected significant effects might have been observed with increase in power (as the report a sample size of $n = 30$).

While these studies suggest the significant influence of visual stimulation on various gambling behaviors, other researchers note limitations inherent in the experimental design of such research (Dowling et al., 2005; Loba et al., 2002). For instance, Loba et al. (2002) call for research that pinpoints the influence of independent structural characteristics on gambling behaviors and potentially addictive features of slot machines. Likewise, Dowling et al. (2005) question the reliability and validity of previous slot machine research that contains simultaneous manipulation of several machine characteristics. They criticize those previous studies on slot machines since multiple manipulations of several features made it difficult to separate the different effects of the individual gambling stimuli. Therefore, the current study manipulates reel speed and duration of spinning separately (and avoids confounds with audio stimuli) so that the independent influences of certain visual features of slot machines can be observed.

The present study focuses on visual stimulation (i.e., the reel speed and duration of spin), examining how individuals' SS levels moderate emotional response to visual stimulation. Gambling researchers note that the visual effects of slot machines are related to an increase in emotional tension, and the production of psychological stimulation (Dowling et al., 2005). Thus, examining the influence of OSL on slot players' emotional responses to independent visual features offers face validity, given that individual differences in OSL affect the general response to environmental stimulation (Zuckerman, 1994). Investigating the impact of varying reel spin in terms of speed and duration is also relevant because a large portion of modern slot machines are video-based, which are arguably more visually stimulating than traditional machines with reels (Christopherson & Weatherly, 2006). Further, studying the influence of specific slot stimuli, like reel spinning features, may be fruitful because of the proliferation of online casino gambling sites, which are also highly dependent on visually-based slot machines.

CHAPTER III

Methodology

This chapter describes the procedures used to investigate if an individual's SS level and gender influence their emotional responses to certain forms of visual stimulation in slot machines. The chapter is divided into the following sections: 1. overview; 2. sample; 3. independent variables; 4. validity checks; 5. dependent variables; 6. apparatus and gambling stimuli; 7. procedures; 8. manipulations; and 9. data analysis techniques.

3.1. Overview

The current study utilizes a pretest/post-test experimental design to explore the potential influence of subjects' personality traits and gender on their emotional response to playing a computer-mediated slot machine. Data from a convenience sample of students who are social gamblers (18 and older) are employed to investigate the differential influence of personality (ImpSS) and gender on dimensional measures of emotion (PAD), as a function of visual stimulation (i.e., manipulations involving the speed and/or duration of slot machine reels). A small pilot study is first conducted to establish the reliability and validity of scaled measures, as well as validity of baseline and treatment stimuli. The first phase of the main study involves gathering data on subjects' personalities and gambling behaviors using self-administered surveys. Demographic information, such as gender, race, and age, is also gathered. Based on their gender and ImpSS levels from the pretest data, subjects are randomly assigned to one of four gambling treatment conditions (i.e., normal speed/normal duration; fast speed/normal duration; normal speed/longer duration; and fast speed/longer duration).

After a brief gambling session (3 plays of the slot machine), subjects complete a self-report on emotional responses (Pleasure-Arousal-Dominance; Mehrabian, 1995) relative to their gambling experience. In order to increase the level of internal validity, other structural characteristics are excluded (e.g., game-dependent sounds, color, light, multiplier potential -- i.e., multiple lines of betting) or controlled via the game design (e.g., winning)

3.2. Sample

Undergraduate student ($N = 287$) volunteers from courses in the Kinesiology Department at the University of Maryland, College Park, participate in the online survey. In an effort to deal with potential subject attrition and to ensure balanced cell sizes across conditions, the main study over-sampled. To enhance ecological validity, this research follows the guidelines put forth by Dickerson and Adcock (1987) by: 1. Using subjects who have gambled as part of their leisure activity; 2. Providing subjects with a financial incentive related to winning/losing; 3. Ensuring that all the relevant components of the gambling environment are realistic (e.g., the equipment used appears authentic). Due to ethical constraints, subjects in the current study did not gamble with their own money and incentives are utilized instead. Powell, Hardoon, Derevensky and Gupta (1999) report that an incentive method can be an effective approach, in simulating (financial) risk elements in gambling research.

In addition to the guidelines above, the subjects are 18 years of age or older. As part of the sampling procedure, they are screened to help assure that no symptoms of pathological gambling are present, to identify social (infrequent) gamblers (i.e., SOGS score from 0 to 4), as assessed by the South Oaks Gambling Screen (SOGS;

Lesieur & Blume, 1987). People with a score of five or higher on SOGS are subsequently categorized as pathological gamblers; therefore, only those who scored less than five are included in the present study (Lesieur & Blume, 1987). Participants in the pretest, who report never having gambled, measured by item 1 (from 1.a. to 1.1.) of SOGS (see Appendix 1), are also not in the main experiment (as they are not social gamblers either). However, all subjects are compensated with course extra credit regardless of their ultimate eligibility for participation in the main experiment. Individuals interested in receiving extra credit but not interested in participating in the research are provided an alternative assignment in order to earn the extra credit.

3.3. Independent Variables

Before the main experiment, an online survey is administered to each subject, in order to obtain their gambling history, personality profile, and demographic information. As a way to track participation (for extra credit) and to match their pretest and post-test responses, subjects enter the last four digits of their student identification number, when accessing the online survey. The survey includes the following instruments:

3.3.1. The South Oaks Gambling Screen (SOGS) (Lesieur & Blume, 1987)

The SOGS is a 16-question screening measure that asks subjects to describe their gambling habits throughout their lifetime (see Appendix 1). Previous research suggests that SOGS is a valid and reliable measure of gambling problems and pathological gambling (Battersby, Thomas, Tolchard, & Esterman, 2002; Stinchfield, 2002; Vachon, Vitaro, Wanner, & Tremblay, 2004; Cox, Enns, & Michaud, 2004). The current study employs the original version of SOGS (See Appendix 1). This scale

is utilized here to help stratify the sample by identifying infrequent/social gamblers and exclude problem gamblers from the study. The majority of the questions are in a forced-choice, yes-no format and the questions are loosely based on the DSM-IV criteria for pathological gambling (Cox, Enns, & Michaud, 2004). The total SOGS index can range from 0 to 20 by summing all scores (since items 1, 2, 3, 12, 16j, and 16k are not counted). The index categorizes people according to gambling types: “no problem,” (0) “some problem” (1 to 4) and “probable pathological gambler” (5 or more).

Stinchfield (2002) examines the reliability, validity, and accuracy rate of the original version of SOGS. He finds that SOGS not only achieves a satisfactory level of reliability ($\alpha = .86$), but also demonstrates construct validity, given its results for treatment populations that show significantly higher scores in SOGS than in the general population ($t = -91, p < .001$). Furthermore, the above study finds that SOGS has a satisfactory level of convergent validity: SOGS significantly correlates with DSM-IV diagnostic criteria in both the general and the treatment populations ($r = .77$ and $.83$, respectively), and a moderate correlation is found with other measures of gambling-problem severity.

3.3.2. *Impulsive Sensation Seeking (ImpSS) (Zuckerman et al., 1991)*

Dickerson and Baron (2000) call for gambling research that employs a modified version of the original SS scale, given the fact that both sensation seeking and impulsivity influence gambling behaviors, though they are moderately related. ImpSS is a reliable and valid alternative to the commonly used 40-item SSS Form V, and it is a part of the broader five-factor personality model of the Zuckerman-

Kuhlman Personality Questionnaire (ZKPQ), which includes Neuroticism-Anxiety (N-Anx), Aggression-Hostility (Agg-Hos), Activity, and Sociability, as well as ImpSS. ImpSS is composed of a 19-item questionnaire (see Appendix 2) with eight items measuring impulsivity and eleven items measuring SS.

As noted in Chapter Two, ImpSS is moderately correlated with SSS Form V ($r = .60$) and is found to have a satisfactory level of reliability (Zuckerman, 1994).

Previous studies find advantages in the design of ImpSS compared to the SSS Form V, such as the usefulness of its general items and its description of non-specific activities, resulting in fewer confounds than for the SSS Form V (Zuckerman 1994; Zuckerman et al., 1993). Furthermore, researchers suggest that as an OSL measure the SSS Form V has certain psychometric limitations, including length and culturally-biased items (Arnett, 1994; Haynes et al., 2000).

3.3.3. Gambling Attitudes and Beliefs Survey (GABS) (Breen & Zuckerman, 1999)

The GABS is a 35-item instrument that measures gambling behaviors, including cognitive biases, irrational beliefs, positively-valued attitudes toward gambling, and chasing (see Appendix 3). Breen and Zuckerman (1999) suggest that GABS measures gambling “affinity.” The questions are constructed on a five-point scale ranging from “strongly agree” to “strongly disagree.” Strong et al. (2004) argue that most instruments of gambling assessment, such as SOGS, focus exclusively on (negative) consequences experienced by gamblers, in order to measure gambling involvement. In contrast, they argue, GABS can assess individuals who are not currently pathological gamblers, but who might exhibit cognitive risk factors indicating a propensity for being problem gamblers. They also indicate that a GABS

assessment measures not only gambling severity, but also a wide range of beliefs, attitudes, values, and cognitive biases. They also find that GABS is a reliable measure of gambling affinity, which shows incremental validity (e.g., predicting increases in the frequency of gambling behavior), and construct validity (e.g., significant correlation with SOGS, $r = .50, p < .05$). Therefore, it is intended for use as a covariate in the current study.

3.3.4. General Information on Gambling Participation

While item 1 of SOGS (i.e., from item 1a. to item 1l.) was not used to identify/exclude problem gamblers from the study, the item was employed to assess the subjects' general gambling participation and history. For example, the first item reads, "Please indicate which of the following types of gambling you have done in your lifetime," and requests an answer along a three-point scale (not at all, less than once a week, once a week or more), thus measuring variety of past gambling experience and participation frequencies for different gambling forms.

3.3.5. Demographics: Gender and Age

The current study includes demographic questions related to the subjects' age and gender. A question regarding the year they were born was framed as an open-ended inquiry in order to reduce response error. The item was recoded as age prior to data analysis. In addition, age is employed in the current study to help examine the construct validity of ImpSS, since it is suggested that there is negative relationship between age and SS (Zuckerman, 1994; Zuckerman et al., 1993; McDaniel, Lee, & Lim, 2001). Similarly, McDaniel and Zuckerman (2003) find that there are gender differences in the relationship between SS and gambling behaviors, which is explored

herein. Gender is also used to examine the construct of ImpSS, since SS research suggests that males show higher levels of the trait than do females (McDaniel et al., 2001).

3.4. Validity Checks

3.4.1. Brief Sensation Seeking Scale (BSSS) (Hoyle et al., 2002)

The current study utilizes the BSSS (Hoyle, Stepheson, Palmgreen, Lorch, & Donohew, 2002) to examine the construct validity of ImpSS (see Appendix 4). BSSS is composed of an 8-item questionnaire, with the four dimensions of SSS Form V represented by two items each. According to Hoyle et al. (2002), BSSS is a valid and reliable alternative of SSS Form V. For instance, the BSSS is positively related to risky behaviors, such as drug use, while the internal consistency coefficient ranges from .74 to .85. They also argue that the BSSS has strength in terms of its reflection of the full subscales of SSS Form V. Previous studies also find moderate correlations between SSS Form V and ImpSS ($r = .60$), and thus the current study examines the validity of ImpSS by examining the correlations between ImpSS and BSSS.

3.4.2. Visual Complexity (VC) (Holbrook et al., 1984)

A measure of Visual Complexity (VC) is utilized as a manipulation check in the pilot study to help establish if there are perceivable differences among treatment conditions. However, VC is not included in the main study. It is suggested that visual stimulation provides gamblers with reinforcement for winning and increases emotional tension and psycho physiological activation (Dowling et al., 2005). The VC measure (see Appendix 5) offers face validity as a manipulation check here, since its development and application by Holbrook et al. (1984), to investigate the effect of

perceived complexity of a computer game (i.e., rocket-landing simulation) on consumers' emotions. Holbrook et al. (1984) suggest that perceived complexity influences behaviors in experiential consumption, such as computer games, and that it is an intervening factor between personality and emotion (and thus seems appropriate in helping to validate the manipulations of visual stimuli in the computer-mediated game in the current study).

3.5. Dependent Variables

3.5.1. Emotion (Pleasure-Arousal-Dominance) (Mehrabian & Russell, 1974)

The current study utilizes an experimental design similar to Holbrook et al. (1984), which examines the influence of personality and performance during usage of computer games. Holbrook et al. (1984) argue that Mehrabian and Russell's (1974) Pleasure-Arousal-Dominance (PAD) scale is suitable to examine emotional responses to intrinsically motivated experiential consumption, such as playing games. Given the fact that gambling is a form of hedonic/experiential consumption, the current study employs the PAD scales (see Appendix 6) to examine 3-multiple dimensions of a gambler's emotions. Previous studies find that the PAD scale is a reliable and valid measure of emotional states (Mehrabian & Russell, 1974, Mehrabian, 1995; Holbrook et al, 1984). The Mehrabian (1995) model includes the dimensions of pleasure-displeasure (P), arousal-nonarousal (A), and dominance-submissiveness (D).

According to this model, the P dimension differentiates between positive emotional states and negative ones, while the A dimension is characterized by a combination of mental alertness and physical activity. Mehrabian (1995) also suggests that the D dimension should be defined in terms of feeling in control and having

influence over events, surroundings, or other people. According to Mehrabian (1998), all of the items in the three categories measure three nearly independent factors. He also finds that the P, A, and D factors account for 27%, 23%, and 14% of total variance of emotion, respectively. Each of the measures is composed of six adjective pairs with the adjectives in each pair separated by seven spaces.

3.6. Apparatus and Gambling Stimuli

Participants in the main phase of the current study engage in computer-mediated gambling, utilizing a slot machine program employed in previous gambling research (Christopherson & Weatherly, 2006; Loba, et al., 2002; Sharpe et al., 2005). According to NGISC (1999), computer-mediated gambling (e.g., internet gambling) is popular among young adults. Slot machines are utilized in the current study because they represent one of the most popular forms of gambling (Walker, 1992; Dowling et al., 2005). Moreover, the use of slots help to reduce potential confounds, such as differing levels of gambling experience, where player skill and/or knowledge of rules could be a factor in emotional response, as is the case with more complex gambling forms such as poker.

The slot machine simulation in the current study is a customized version of the one originally developed by MacLin, Dixon, and Hayes (1999). The gambling software program operates in the Microsoft Visual Basic programming language and was loaded on IBM-compatible computer. The simulated slot program is employed in this study, since it permits manipulation of variables that would be difficult (if not impossible) to investigate in a natural setting (in the U.S.). For example, the software provides the experimenter the ability to manipulate the number of symbols, the speed

at which reels spin, and audio stimulation (MacLin et al., 1999). While there have been criticisms of simulated casino gambling in laboratory settings (cf. Anderson & Brown, 1984), the current study is not meant to generalize to casino contexts but instead focuses on computer-mediated gambling, similar to the internet or video games for home computers.

The slot machine program employed herein is also useful in this research context because the audio/video stimuli and number of wins can be manipulated; thus, it is arguably more suitable to the current study than “off the shelf” gambling programs. Previous studies suggest that winning plays a crucial role in gambling behaviors (Delfabbro & Winefield, 2000; Ladouceur et al., 1988; Ladouceur et al., 2003; Weatherly & Brandt, 2004). Near wins and near losses also influence gambling behaviors (Griffiths, 1999; Kassinove & Schare, 2001). As a result, winning is controlled for in the current research, by predetermining exactly which symbols will result in a winning line in each trial, as well as near wins and losses. The design is such that subjects experience a win, a loss, and a near win across three trials, with the sequence of those results randomized across conditions, in an effort to control ordering effects.

3.7. Procedure

3.7.1. Pilot Study

The pilot study involves two phases. The purpose of the first phase ($N = 107$) is to examine the validity and reliability of scaled measures by conducting an online survey. The sample in the pilot study consists of 46 males and 61 females, with an average age of 22 years (range: 19-36; $SD = 3.11$). The subjects in this study are

excluded from the main study. Data is collected from physical activity classes, since those classes facilitate the recruitment of subjects from a variety of academic backgrounds and majors. The scaled measures include SOGS, ImpSS, BSS and PAD. The pretest methodology involves the use of a self-administered online survey. The researcher went into classrooms and introduced the purpose of the study and asked student volunteers to sign an informed consent form. Subjects were also informed that they were to be given extra credit (i.e., 3 points) for the study participation. Afterwards, participants were informed of the online survey website address and asked to complete the survey. The survey took approximately 20 minutes for them to complete.

The second phase of the pilot study attempts to validate the baseline tasks and manipulations of the slot machine program (i.e., reel speed and duration of its spinning). Among the participants in the online pilot survey, 28 subjects volunteered to participate in the second (experimental) phase. The subjects in the latter phase received additional extra credit (i.e., 2 points). As in the first phase, participants were asked to sign an informed consent form for phase two upon arriving for the experiment. After completing the consent form, the participants were instructed to sit at the computer monitor and asked to read instructions related to the experimental protocols. The experiment administrator answered participants' questions regarding the study and their grasp of the instructions prior to their beginning the baseline task.

Subjects then completed a series of baseline tasks, such as listening to meditation music, solving simple arithmetic questions, and then looking at a series of soothing black and white landscape pictures. This phase took approximately ten

minutes. Upon completion of the baseline tasks, subjects' emotional states are measured, using the PAD scale. The pilot study involves only P and A dimensions, since the primary purpose of the baseline tasks is to control these two states and not the D dimension (cf. Leary & Dickerson, 1985). Following the baseline task, subjects are exposed to two slot conditions, in which subjects play each slot condition once. The first spin involves what was intended to be the condition with the highest level of visual stimulation (i.e., fastest reel speed and longest duration of spin), while their second spin involved what was intended to be the condition with the lowest level of visual stimulation (i.e., slower reel speed and shorter duration). The conditions were set a priori as near misses, since research suggests that winning influences gamblers' emotion (Ladouceur et al., 2003).

After exposure to the first condition (i.e., high visual stimulation), subjects' emotion is measured again, using the P and A scales, in order to examine if subjects' participation in the gambling task produced any emotional changes from their baseline measures of affect. Then, subjects play the second slot condition (high visual stimulation) and then respond to an adapted version of Holbrook et al.'s (1984) visual complexity scale, to examine if there were any perceivable differences between the first and second conditions. Subjects' feedback on the overall gambling task by an open-ended question was also gathered to assess participants' difficulty in using the computer and in understanding the slot-machine game. The pilot study data are analyzed and results (see Section 4.1 in Chapter 4) indicate that the scaled measures reached acceptable levels of reliability and that the baseline tasks and experiment

treatment are internally valid. Thus, the data support that the scales and gambling treatments are suitable for use in the main study.

3.7.2. Phase 1: Pretest and Preparation for the Main Study

A pretest ($N = 287$) is first conducted to collect information on subjects' personality, gambling behaviors, and demographics. As noted, the research involves over-sampling in the pretest, given the stratified sampling, and attempt to deal with subject attrition. Data are collected from University of Maryland students, recruited through courses in the Department of Kinesiology. The scaled measures include ImpSS, BSSS, GABS and SOGS. Similar to the pilot study, the pretest methodology in the main study involves a self-administered online survey. After the researcher introduces the purpose of the study and asks subjects to sign an informed consent form, participants are given the online survey website address and asked to complete the survey (see Appendix 7). The survey took approximately 20 minutes for subjects to finish.

Among pretest participants, 200 volunteers are selected to take part in the main experiment; non gamblers and pathological gamblers are excluded in the main study based on the SOGS diagnostic, history of gambling participation and attrition (as some subjects elected not to participate in the main study). The main experiment in the current study employs a randomized block design in which subjects ($N = 200$) are randomly assigned to one of four slot machine conditions (normal speed/normal duration; high speed/normal duration; normal speed/longer duration; and high speed/long duration), based on their gender and ImpSS levels (see Appendix 14). Similar to McDaniel and Zuckerman (2003), ImpSS responses are calculated and a

tripartite division of scores by gender were used to create low, moderate and high SS designations.

Dowling et al. (2005) criticizes most experimental studies on slot machines in terms of the simultaneous manipulation of several features, which limits validity. Therefore, the current study extends previous studies on gambling stimuli by examining the influence of isolated game characteristics (via either varying reel speed or extended reel spin duration conditions), as well as combined features (via one condition that combines accelerated reel speed and extended spin duration). The slot software allows the experiment administrator to input a number associated with the subjects' various group assignment prior to their arrival. Since the pretest surveys (i.e., the personality profile and gambling history) and experiments are conducted at different times and places, participants give the last four digits of their student identification numbers prior to the start of the experiment in order to match post-test responses with their pretest data.

Following the baseline tasks, participants then individually play the computer-simulated slots. Among possible gambling forms, slot machines are employed in the current study due to their simplicity and popularity, compared to other mechanical games (Dowling et al., 2005; Walker, 1992). As Petry (2003) argues, slot machines provide each user with a unique level of stimulation and thus people may respond to them differently as a function of their OSL. Furthermore, McDaniel and Zuckerman (2003) indicate that each form of gambling represents a unique potential level of psychological arousal. Therefore, the researchers for this study considered slot machines a good choice, due to their popularity among gamblers, their stimulus

properties and the ability to manipulate them, their relative ease of play, and the increased ability to control for skill and winning (as compared to other forms of gambling, such as poker or sports betting).

3.7.3. Phase2: Familiarization and Instruction

Subjects are individually scheduled to participate in the main experiment, with each session lasting approximately 20 minutes. Upon arrival at the research facility, they are first asked to sign an informed consent form prior to beginning the session. Upon completion of the introductory session, participants are then asked to read a set of written instructions that describe general information of the study, which subjects read at their own pace (see Appendix 8). The written instruction is used in order to minimize interactions between subjects and experiment administrator. Since some subjects might not be familiar with slot-machine gambling, the first step of the experiment is designed to ensure that all participants have a full understanding of the operation of slot machines, prior to the play. The directions inform subjects that they are going to play a computer-based slot machine game, and that after the gambling task, they will answer a short survey. The administrator then asks if there are any questions on playing the slot machine before starting the main experiment and these questions are answered verbally by the administrator.

As mentioned earlier, in an effort to control potential arousal effects associated with winning (and payouts), all subjects experienced the same number of outcomes across three pulls (one win, one near win/loss, and a loss, with the order rotated across the four conditions).

3.7.4. Phase 3: Gambling, Baseline and Measurement

Prior to playing the slot machine, participants complete baseline tasks in one of three baseline stations, where they are surrounded by partitions in order to minimize visual distractions and to shield the presence of other subjects, as they read written instructions (see Appendix 9). The duration of each baseline session and gambling task is guided by written instructions. They are provided a headset by the experiment supervisor for the baseline task (listening to soothing music). The administrators prepare four baseline manipulations in order to control baseline emotion and cognition (Sharpe et al., 1995). The baseline manipulations include: 1) listening to meditation music on headphones during the duration of baseline tasks, in order to help lower baseline arousal states; 2) reading travel or yoga magazines for five minutes (to avoid arousing images); then 3) solving simple math tests for two minutes, to help clear their minds and control baseline cognitive load; and 4) looking at a series of soothing black and white landscape pictures (see Appendix 10 & 11) for three minutes, to control emotional and cognitive load (Dickerson & Adcock, 1987; Leary & Dickerson, 1995). Soothing music is employed in an effort to control pretest arousal, given that certain types of music, such as rock and metal, could confound the effects of the gambling treatments (Leary & Dickerson, 1995). The math questions involve simple arithmetic (e.g., $10 + 5 = _?$), since any difficulty in solving problems could create cognitive tension or raise certain emotions (e.g., frustration).

After the baseline tasks are completed, participants are then instructed to complete measures of P and A (Mehrabian, 1995) and to read written instructions which included detailed information about the slot game, such as prizes and their

values, number of plays (i.e., 3 trials) that they are to be given, and possible winning combinations (see Appendix 12).

Due to ethical constraints, participants did not play with real money, but instead were given \$3.00 virtual credit on the computerized slot machine (where each spin “costs” \$1.00). However, incentives are provided in order to simulate a real playing situation; the written instructions (immediately following the baseline measures) inform participants that they have a chance to win a prize(s) (e.g., \$25 Best Buy gift card for three cherries), based on certain winning combinations (e.g., three cherries; see Appendix 12). The directions note that, upon completion of the experiment, participants will be given a certain number of drawing slips (Monopoly® money) equivalent to their winnings over the initial \$3.00 supplied; these slips are to be subsequently placed into a pool for a drawing to be held upon completion of the study. Previous research suggests that the incentive method can be an effective surrogate to real money, in gambling research (Powell et al., 1999; Gupta & Derevensky, 1996).

Subjects are then asked to move to the experimental chamber, where subjects individually play the computer-simulated slot machine. During the entire gambling session, subjects listen to ambient casino sounds, on headphones, in an effort to control for external noise and to make the slot game more realistic. Further, machine-related sounds (e.g., sound of coins falling into metal tray or bells and buzzers) are not part of the audio, since game-related sounds can also influence subjects’ emotional responses and can potentially confound results, in terms of isolating potential effects of visual stimuli in such experiments (Dowling et al., 2005). The main experiment is

conducted in a separate room than baseline, in order to control the noise, while the light in the experimental chamber is dimmed in an effort to help subjects focus more on game stimuli without other visual distractions. In addition, the experiment supervisor was not in the experimental chamber, during the gambling session, since the presence of another might influence subjects' gambling behaviors and responses.

Once seated in the experimental chamber, participants are instructed to read another set of written instructions (see Appendix 13), regarding how to play the game, including use of the spin button, total credits, amount and payout values, while the slot game is displayed on computer monitor, to ensure that subjects fully understand the features of the game. As noted, the gambling task involves three trials, where all subjects experience a win, near win and a loss, with the sequence of winning randomized in an effort to minimize ordering effects. When the gambling tasks conclude, participants subsequently complete measures of P, A, and D

3.8. Manipulations

One purpose of the present study is to investigate whether OSL, assessed by ImpSS, moderates consumers' emotional response to certain visual stimulation during participation in computer-mediated slots. Since prior research suggests that the speed of the spinning reels and duration of their spinning are among the more arousing game features (Loba et al., 2002; Sharpe et al., 2005), the current study focuses on reel speed (i.e., fast spinning versus slow spinning) and duration of reel spinning (i.e., 14 seconds versus 21 seconds) as independent variables. Furthermore, in order to increase the level of internal validity, other environmental stimuli, such as flashing lights, number of symbols in each reel, modality of symbol presentation (i.e., all reels stop at

once versus stopping sequentially), and color, are controlled for here. In addition to controlling the above visual effects, the current research also attempts to control other structural characteristics of slot-machine gambling, including multiplier potential (e.g., multi-lines and multi-credit) and multiple coin and bill and acceptors (cf. Dowling et al., 2005).

3.9. Data Analysis

Internal consistency coefficients for SOGS, GABS, ImpSS, BSSS and PAD are employed to examine their construct reliability. One-way Analysis of Variance (ANOVA) is employed in order to assess the validity of ImpSS, with regards to gender and age (McDaniel et al., 2001; Zuckerman, 1994). The Pearson correlations among BSSS, GABS, and ImpSS are also examined as part of the validity checks. Further, Chi-Square tests, independent-samples t tests and one way ANOVA techniques are utilized to examine the internal validity of manipulations. Given the gender difference in gambling behaviors, the hypotheses are analyzed separately by gender. In order to test the hypotheses in this study, repeated measures of ANOVA are utilized to investigate the moderating influence of visual stimulation in slot machines for two of the three dimensions of emotion (P & A). Further, ANOVA is used to examine the influence of personality and treatment conditions on D. Analysis of Covariance (ANCOVA), with GABS as a covariate, is employed to test the effects of winning sequence on each of the three dependent variables (PAD).

Chapter IV

Results

The current study investigates the influence of individuals' need for stimulation and gender on their emotional responses to certain visual stimuli on a computer-mediated slot machine. More specifically, the research examines whether subjects' emotional responses to varying levels of reel speed and/or duration of reel spin differ as a function of their SS levels and gender.

Addressing the study's results, this chapter first summarizes the outcomes of the pilot study. Next it provides descriptive information about subjects in the main experiment, as well as details about some of their behaviors prior to participation, such as amount of exercise, consumption of caffeinated drinks, and smoking, as well as information on subjects' gambling participation. The third part of this chapter discusses reliability of scaled measures used in the current research, and validity checks, including construct validity, predictive validity, and internal validity. Finally, results related to hypotheses and research questions are presented.

4.1. Pilot study

The pilot study consists of two phases. The first phase ($N = 107$) is designed to examine the validity and reliability of scaled measures, while the purpose of the second phase ($N = 28$) is to validate baseline tasks and manipulations of the slot machine program. The pilot data ($N = 107$) indicate that all of the scaled measures intended for use in the main study result in acceptable levels of internal consistency. Both ImpSS and BSSS reach an alpha of .81, while alpha coefficients for pleasure, arousal, dominance, and visual complexity are .80, .87, .88, and .80, respectively.

Data from the second phase of the pilot study indicate that subjects' level of arousal is significantly below the midpoint (i.e., 3 in 5 point-scale) after completing the baseline tasks ($M = 2.17$, $SD = .45$; $t = -9.87$, $df = 27$, $p < .01$), which supports the efficacy of the baseline protocol. Furthermore, subjects' posttest data indicate that there is a significant difference between responses to treatment and control conditions (i.e., faster reel speed/longer spin duration vs. normal reel speed/normal spin duration) in terms of perceived visual complexity ($M = 2.69$, $SD = .52$; $t = -.3149$, $df = 26$, $p < .01$), which supports the validity of the intended manipulations. Answers to open-ended questions are also in line with the above results in that of 28 subjects 27 report perceivable differences in speed between conditions, while 16 participants report noticing a difference in the duration of spins.

4.2. Main Study Sample Description

Table 1 shows descriptive information about the subjects in the main study. From a total of 287 subjects in the initial subject pool, 200 participate in the posttest. Selection of subjects to participate in both phases of the main study is based on the SOGS, from which pathological gamblers and non-gamblers are excluded. Females comprise 46% ($n = 92$) of the sample, while mean age was 21.9 (range = 19 – 34, $SD = 2.00$).

Table 1. Descriptive Statistics of Age, Gender, and Pre-experiment Behaviors (Exercise, Consumption of Caffeinated Drinks, and Smoking) on the Day of Experiment

Variables	<i>n</i>	%
Gender		
Male	108	54%
Female	92	46%
Exercise		
Yes	57	29%
No	142	71%
Smoking		
Yes	10	5%
No	189	95%
Drink caffeinated drinks		
Yes	73	35%
No	126	63%

N = 200

Given that arousal is one of the primary focuses of the current research, certain behaviors on the day of experiment (that might otherwise influence subjects' arousal level prior to participation in the experiment session) are gathered. Descriptive information on those behaviors is therefore provided above in Table 1, while the results in terms of validity will be discussed later in this chapter. About 29% (*n* = 57) of the subjects report exercising on the day of the experiment and 5% (*n* = 10) of them note that they smoked a cigarette on that day, while 37% (*n* = 73) of the sample report consumption of caffeinated products prior to participating in the experiment.

Using data from the SOGS, gambling participation is calculated based on twelve questions that query respondents on their participation in specific types of gambling over the past 6 months; these stated forms of gambling represent the most popular gambling forms. The gambling participation questions employ 3-point

anchors, including “never,” “less than once a week” and “once a week or more.” The “never” response is recoded as 0, while both “less than once a week” and “once a week or more” are recoded as 1, creating dichotomous variables for gauging participation in each type of gambling over the last half year, as shown in Table 2. A score indicating variety in gambling participation is also created, by summing the scores from the dichotomous variables. The results of an independent-samples t test on this data indicate that male participants ($M = 5.73$, $SD = 2.55$) report participating in a significantly greater ($t = 4.51$, $df = 189$, $p < .05$) variety of gambling forms than did females in the study ($M = 4.08$, $SD = 2.47$).

In terms of the slot machine experience, the majority of the sample (54%, $n = 107$) report that they have played a slot machine before, making it the third most popular form of gambling among subjects in the study, with 3% reporting participation greater than once a week. A slightly larger percentage of male subjects (59%) report they had played slot machines before, as 47% ($n = 43$) of female participants report prior experience with slot machines. Table 2 shows the descriptive information about participation in different gambling types by gender.

Table 2. *Descriptive Statistics of Participation in Each Type of Gambling over the Past 6 Months by Gender.*

Gambling Type	Male (<i>n</i> = 108) <i>n</i> (%)	Female (<i>n</i> = 92) <i>n</i> (%)	Total (<i>n</i> = 200) <i>n</i> (%)
Cards (e.g., Poker)	98 (91%)	52 (57%)	105 (75%)
Betting on Horse racing	33 (31%)	17 (19%)	50 (25%)
Betting on Sport	72 (67%)	23 (25%)	95 (48%)
Dice Game (e.g., Craps)	38 (35%)	15 (17%)	53 (27%)
Casino	65 (60%)	52 (57%)	117 (59%)
Lottery	52 (48%)	53 (58%)	105 (53%)
Bingo	32 (30%)	34 (37%)	66 (33%)
Stock, or commodity market	30 (28%)	9 (10%)	39 (20%)
Skill (e.g. play golf for money)	75 (70%)	24 (26%)	99 (50%)
Paper games other than lottery	16 (15%)	25 (28%)	41 (21%)
Slot machine	64 (59%)	43 (47%)	107 (54%)
Other	43 (22%)	19 (10%)	62 (32%)

Note. Percentages in both male and female indicate within gender.

Of the various gambling forms mentioned in SOGS, card playing is the most prevalent activity among all respondents in the current research, as 75% of all respondents (*N* = 200) report having played during the past 6 months. However, card playing is more common for male respondents than for female subjects, as 91% of all male participants in the study (*n* = 108) report having played, compared to 57% for female subjects. For male subjects, this is followed by betting on games of skill (e.g., playing golf or pool for money) (70%) and placing bets on sporting events (67%). In contrast, the most popular gambling type for female respondents is lottery play (58%), followed by card playing (57%) and casino gambling (57%). Conversely paper games other than lottery (15% of males) and stock (10% of females) have the lowest occurrence of the listed gambling activities for males and females respectively.

4.3. Reliability

Table 3 shows the number of items, range, mean, SD, and reliability for each scaled measure including GABS, ImpSS, BSSS, arousal (pre-post), pleasure (pre-post), and dominance. Reliability tests of most scaled measures result in satisfactory levels consistent with previous studies (cf. Strong et al., 2004; Mehrabian, 1995; Zuckerman et al., 1993; McDaniel & Zuckerman, 2003; Hoyle et al., 2002). For instance, GABS, ImpSS, and BSSS reach an alpha of .87, .79, and .78 respectively, while dependent variables, including pretest pleasure, posttest pleasure and posttest dominance, have alphas of .81, .85 and .70 respectively. While arousal measure reached an alpha of .80 in the pilot study, the internal consistency of pretest arousal in the main study was somewhat low ($\alpha = .59$). However, since arousal is measured twice (i.e., after baseline tasks and after gambling tasks), and the second measure of arousal, which is the primary focus of the current investigation, had an alpha of .78, it the pretest measure was deemed acceptable for use here.

Table 3. Number of Items, Range, Mean, SD, and Reliability of Scaled Measures

Scale	No.of items	Range	<i>M</i>	<i>SD</i>	α
GABS	35	1-5	3.02	.40	.87
ImpSS	19	0-18	8.02	4.01	.79
BSSS	8	1-5	3.32	.65	.78
Arousal 1	6	1-5	2.2	.46	.59
Arousal 2	6	1-5	3.57	.61	.78
Pleasure 1	6	1-5	3.93	.60	.81
Pleasure 2	6	1-5	3.64	.63	.85
Dominance	6	1-5	2.97	.56	.70

Note. Arousal 1 and Pleasure 1 indicate subjects' ($n=200$) baseline responses, whereas Arousal 2 and Pleasure 2 indicate post-experiment levels of measure.

4.4. Validity

4.4.1. Construct Validity

Table 4 shows zero-order correlations between GABS, ImpSS, its Impulsivity (Imp) and Sensation Seeking subscales (SS), and the BSSS. The data support construct validity of GABS in terms of its positive correlation with ImpSS ($r = .24, p < .05$), Imp ($r = .20, p < .05$) and SS ($r = .29, p < .05$), while ImpSS is strongly positively correlated with BSSS ($r = .70, p < .05$), which is consistent with previous studies (Breen & Zuckerman, 1999; Breen 2000, Hoyle et al., 2002). In addition, data suggest males ($M = 8.15, SD = 4.09$) report slightly higher mean SS levels than their female counterparts ($M = 7.86, SD = 3.94$). While there are not statistically significant differences ($t = .51, df = 198, p = .61$), this aforementioned pattern of means is in line with previous studies (Zuckerman, 1994; Zuckerman et al, 1991; McDaniel & Zuckerman, 2003).

Table 4. *Zero-order Correlations between GABS, ImpSS, BSSS, Imp, and SS*

	GABS	ImpSS	BSSS	Imp	SS
GABS					
ImpSS	.18*				
BSSS	.21**	.70**			
Imp	.15*	.84**	.44**		
SS	.14*	.83**	.74**	.41**	

$N = 200$.

* $p < .05$.

** $p < .01$.

Note. Imp and SS indicate Impulsivity and SS subscale from the ImpSS respectively.

4.4.2. Predictive Validity

Predictive validity of both GABS ($r = .40, p < .05$) and ImpSS ($r = .15, p < .05$) is supported as both are positively correlated with total gambling participation (see Table 5). Likewise, mean ImpSS, of those who reported consumption of tobacco products on the day of experiment ($M = 2.44, SD = .59$) is significantly higher ($t = .23, df = 197, p < .05$) than for those who reported no use of tobacco products ($M = 2.19, SD = .44$). All of the above are consistent with existing SS research (McDaniel & Zuckerman, 2003; Breen & Zuckerman, 1999; Lejuez et al., 2002).

Table 5. Zero-order Correlations between ImpSS, GABS, Gambling Participation over the Last Six Months, and Smoking on the Day of Experiment.

	ImpSS	GABS	Gambling Participation	Smoking
ImpSS				
GABS	.18*			
Gambling participation	.15*	.41**		
Smoking	.17*	.15*	.02	

$N = 200.$

* $p < .05.$

** $p < .01.$

Note. Gambling Participation is total number of gambling forms participated over the last 6 months.

4.4.3. Internal Validity

This section addresses the internal validity of sample distribution across conditions, in terms of ImpSS and GABS, as well as baseline manipulations. As shown in Table 6, data confirm the validity of random assignment to treatment conditions, by showing the balanced sample distribution in terms of tripartite ImpSS categories for both males ($\chi^2 = 7.73, p = .26$) and females ($\chi^2 = 2.23, p = .90$).

Table 6. Number of Subjects in Each Treatment Condition by Gender and ImpSS.

Condition	Male				Female			
	ImpSS				ImpSS			
	Low	Medium	High	Total	Low	Medium	High	Total
1	2	14	8	24	5	7	9	21
2	10	10	9	29	9	7	8	24
3	8	12	7	27	8	9	7	24
4	11	14	3	28	6	13	4	23
Total	31	50	27	108	28	36	28	92

$N = 200$

Note. Condition 1 = normal speed/normal duration; Condition 2 = faster speed/normal duration; Condition 3 = normal speed/longer duration; and Condition 4 = faster speed/longer duration.

The results of one-sample t tests indicate that subjects' reported arousal levels are significantly lower than the scale midpoint ($M = 2.22$, $SD = .46$; $t = -24.66$, $df = 198$, $p < .05$), while the pleasure levels they reported are significantly higher than the scale midpoint ($M = 3.94$, $SD = .60$; $t = 21.91$, $df = 198$, $p < .05$), which shows the validity of baseline tasks.

In order to confirm that there are no mean differences in terms of GABS and baseline emotions (i.e., arousal and pleasure) across conditions, Chi-square tests and One-way ANOVA tests are conducted. Chi-square coefficients suggest that there are no significant differences in GABS between each cell for both males ($\chi^2 = 3.15$, $p = .79$) and females ($\chi^2 = 8.24$, $p = .22$). One-way ANOVA results also support that the GABS means had no significant differences across conditions [$F(3, 169) = .45$, $p = .72$], which shows the efficacy of sample assignment (i.e., random distribution). Given that the dependent variables for the current investigation are emotional responses (i.e., pleasure and arousal), it is important to ensure that the baseline emotions are not different between conditions. One-way ANOVA results show no

significant differences in either baseline arousal [$F(3, 195) = .39, p = .80$] or pleasure [$F(3, 195) = 1.13, p = .34$] across all conditions (see Table 7).

Table 7. Mean and SD of Baseline Arousal and Pleasure

Condition	Baseline Arousal		Baseline Pleasure	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1	2.20	.45	3.87	.67
2	2.15	.47	4.05	.54
3	2.24	.43	3.95	.58
4	2.21	.48	3.85	.61
Total	2.20	.47	3.93	.60

$N = 200$

Further, given the possibility that some of the subjects' pre-experiment behaviors might influence their baseline arousal levels, these were also tested (see Table 8). Independent sample t-test results show that exercise ($t = .41, df = 197, p = .92$), consumption of caffeinated drinks ($t = 1.67, df = 197, p = .10$), and smoking ($t = 1.66, df = 197, p = .10$) had no significant influence on baseline arousal levels. Likewise, exercise ($t = -.81, df = 197, p = .42$), consumption of caffeinated drinks ($t = .55, df = 197, p = .58$), and smoking ($t = .08, df = 197, p = .93$) did not significantly affect baseline levels of pleasure, as illustrated in Table 8.

Table 8. Independent Sample T-tests for Group Differences in Baseline Level of Arousal and Pleasure by Exercise, Caffeine Consumption, and Smoking.

	Arousal		Pleasure	
	<i>t</i> (df)	sig.	<i>t</i> (df)	sig.
Exercise	.41 (197)	.92	-.81 (197)	.42
Caffeine	1.67 (197)	.10	.55 (197)	.58
Smoking	1.66 (197)	.10	.08 (197)	.93

$N = 200$

4.5. Hypothesis Testing- Hypothesis One

The first research hypothesis posits that subjects' arousal levels differ as functions of ImpSS levels and treatment conditions (i.e. reel speed & duration of spin). Hair, Black, Babin, Anderson, and Tatham (2006) argue that covariates and independent variables should not be correlated, since the covariate(s) may explain variance in dependent variable that would also be explained by the independent variable(s). In order to examine if data conform to assumptions of the above technique, the relationships between GABs and IVs are examined. First, a significant correlation is found between the proposed covariate and ImpSS ($r = .18, p < .05$). Second a t-test reveals significant differences in GABs by gender ($t = 4.50, df = 198, p < .05$). Consequently, given the above violations of statistical assumptions for the covariate, as well as gender differences in gambling behaviors and involvement established in previous gambling studies, data are analyzed separately by gender (Kassinove, 1998; McDaniel & Zuckerman, 2003). Repeated measures of Analysis of Variance (ANOVA) is utilized, with tripartite groups of ImpSS (HSS, MSS, vs. LSS) and experimental condition (normal speed/normal duration, faster speed/normal duration, normal speed/longer duration, and faster speed/longer duration) as independent variables. A Repeated Measures Design (RMD) is utilized here, given the same dependent variables are measured in pre and posttests (Hair et al., 2006). Several advantages of the repeated measures analysis can be identified, including reducing unsystematic variability and providing greater power (Scariano & Davenport, 1987).

Given that the repeated measures of ANOVA employs the Multivariate Analysis of Variance (MANOVA) technique, several assumptions in MANOVA, including the equality of covariance matrices, error variances, and sphericity are tested.

Although Bartlett’s test does not confirm the assumption of homoscedasticity for both male and female subjects (see Table 9), both the Leven’s test (Males: baseline arousal, $F(11, 95) = .60, p > .05$; gambling arousal $F(11, 95) = 1.16, p > .05$; Females: baseline arousal $F(11, 80) = .62, p > .05$; gambling arousal $F(11, 80) = 1.97, p > .01$) and the Box’s M-test (Males: Box’s M = 42.91, $p > .05$; Females: Box’s M = 37.03, $p > .05$) confirm the assumption of homoscedasticity. Mauchly’s test could not estimate level of significance in terms of the variance in the differences between treatment conditions, since the current research had only two repeated measures, and thus the degrees of freedom were corrected by Greenhouse-Geisser estimates of sphericity ($\epsilon^2 = 1$).

Table 9. *Bartlett’s Test of Sphericity between Baseline Arousal and Gambling arousal for Males and Females.*

	Likelihood Ratio	Chi-Square	df	Sig
Male	.00	7.22	2	.03
Female	.00	5.73	2	.04

$N = 200$

4.5.1. Interaction effects of ImpSS and Experiment Condition on Levels of Arousal

Contrary to the expectations in H1a to H1d, the data analyses reveal no significant interaction effect between ImpSS and reel speed on subjects’ levels of arousal for either male or female subjects. Likewise, no significant interaction effect

between ImpSS and spin duration on levels of arousal was detected for male or female respondents (see Table 10 & 11). However, results do indicate that both males [$F(1, 95) = 194.18, p < .01, \eta^2 = .67$] and females [$F(1, 80) = 422.80, p < .01, \eta^2 = .84$] report higher than baseline arousal levels after playing slots (Males: baseline arousal $M = 2.24, SD = .48$, gambling arousal $M = 3.54, SD = .65$; Females: baseline arousal $M = 2.15, SD = .42$, gambling arousal $M = 3.61, SD = .55$).

Table 10. *Effects of Experiment Task, ImpSS, and Condition on Levels of Arousal for Males.*

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Between subjects				
ImpSS	2	3.14	.06	.05
Condition	3	4.53	.13	.01
ImpSS X Condition	6	1.31	.08	.26
error	95			
Within subjects				
Experiment Task	1	194.18	.67	.00
Experiment Task X ImpSS	2	.05	.00	.95
Experiment Task X Condition	3	.55	.02	.65
Experiment Task X ImpSS X Condition	6	.56	.03	.76
error	95			

$N = 200$

Note. Experiment tasks = baseline task X gambling task

Table 11. *Effects of Experiment Task, ImpSS, and Condition on Levels of Arousal for Females.*

Source	<i>df</i>	<i>F</i>	η^2	<i>P</i>
Between subjects				
ImpSS	2	.20	.01	.81
Condition	3	1.25	.05	.30
ImpSS X Condition	6	.42	.03	.86
error	80			
Within subjects				
Experiment Task	1	422.80	.84	.00
Experiment Task X ImpSS	2	2.99	.07	.06
Experiment Task X Condition	3	.07	.00	.98
Experiment Task X ImpSS X Condition	6	.67	.05	.67
error	80			

N = 200

Note: Experiment tasks = baseline task X gambling task

4.5.2. *Main Effects of ImpSS and Experiment Condition on Levels of Arousal*

Data analysis reveals that there was a significant main effect of ImpSS [$F(2, 95) = 3.14, p < .05$] for male respondents (see Table 10), where HSS individuals ($M = 3.09, SD = .08$) scored higher on arousal than both MSS subjects ($M = 2.84, SD = .06$) and LSS respondents ($M = 2.96, SD = .09$). Results of a post hoc Bonferroni test reveal that HSS group report significantly higher arousal levels than MSS group. Although there was no significant main effect of ImpSS for female subjects, arousal does conform to expectations, as the HSS ($M = 3.96, SD = .10$) reported higher arousal levels than MSS ($M = 3.90, SD = .08$) and LSS ($M = 3.61, SD = .10$).

A main effect for treatment conditions is also found for male subjects [$F(3, 95) = 4.53, p < .05$], where subjects in the faster-longer condition report the highest arousal levels ($M = 3.17, SD = .09$), as shown in Table 10. Further, as shown in Figure 2, post hoc analysis using a Bonferroni test indicates that male subjects show

significantly higher arousal after playing the normal speed/normal duration game ($M = 3.07$, $SD = .11$) than those who played the faster speed/normal duration game ($M = 2.79$, $SD = 0.73$). Further, those who played the faster/longer duration game ($M = 3.17$, $SD = .09$) report higher levels of arousal than those who played both the faster speed/normal duration and normal speed/longer duration games ($M = 2.82$, $SD = .08$; see Figure 2). However, the current study did not find significant main effects of slot stimuli on arousal levels for female participants.

Figure 1. Main effect of ImpSS on levels of arousal for male subjects

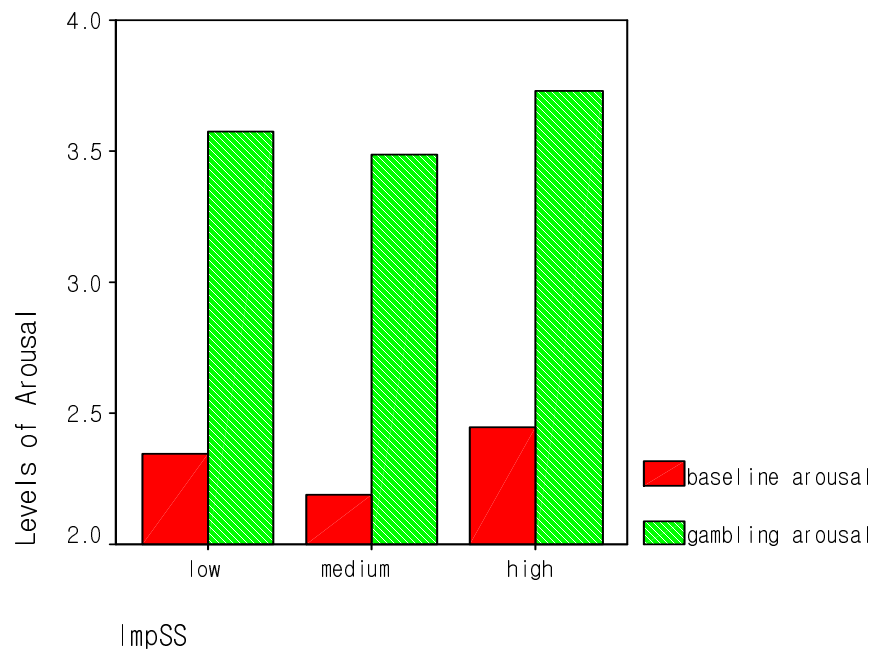
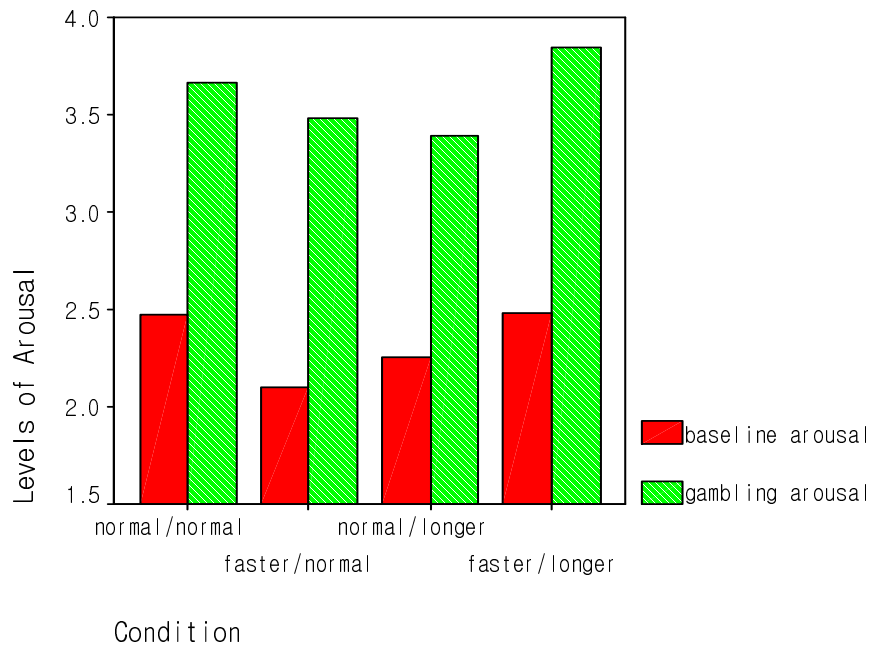


Figure 2. Main effect of treatment condition on levels of arousal for male subjects



4.6. Hypothesis Testing - Hypothesis Two

The second research hypothesis predicts that subjects' ImpSS levels and slot manipulations (i.e., reel speed and spin duration) would influence self-report measures of pleasure. It was expected that HSS would report higher levels of pleasure when exposed to more visually stimulating conditions (i.e., faster speed and longer duration). As with previous hypotheses, data were split by gender in consideration of the gender differences in gambling attitudes and behaviors (Kassinove, 1998; McDaniel & Zuckerman, 2003). Likewise, based on Mauchly's test, the degrees of freedom were corrected by Greenhouse-Geisser estimates of sphericity ($\epsilon^2 = 1$). Bartlett's test does not confirm the assumption of homogeneity of variance ($p < .05$; see Table 12). However, both Leven's test (Males: baseline pleasure, $F(11, 94) = 1.00, p > .05$;

gambling pleasure $F(11, 94) = 1.18, p > .05$; Females: baseline pleasure $F(11, 80) = 1.14, p > .05$; gambling pleasure $F(11, 80) = .44, p > .05$) and Box's M-test (Male: Box's M = 36.19, $p > .05$; Female: Box's M = 30.24, $p > .05$) confirm the assumption of homoscedasticity.

Table 12. *Bartlett's Test of Sphericity between Baseline Pleasure and Gambling Pleasure for Males and Females.*

	Likelihood Ratio	Chi-Square	Df	Sig.
Male	.00	24.02	2	.00
Female	.01	8.97	2	.01

$N = 200$

4.6.1. *Interaction Effects of ImpSS and Experiment Condition on Levels of Pleasure*

The results of the study revealed that, contrary to the research hypotheses, there is no significant interaction effect between ImpSS and reel speed on subjects' levels of pleasure for either male and female subjects (see Table 13 & 14). Likewise, the prediction that subjects' levels of pleasure vary as functions of ImpSS and spin durations is also not supported for either male and female respondents (see Table 13 & 14).

Table 13. *Effects of Experiment Task, ImpSS, and Condition on Levels of Pleasure for Males.*

Source	<i>df</i>	<i>F</i>	η^2	<i>P</i>
Between subjects				
ImpSS	2	.25	.01	.78
Condition	3	.64	.02	.59
ImpSS X Condition	6	.51	.03	.80
Error	94			
Within subjects				
Experiment Task	1	13.98	.13	.00
Experiment Task X ImpSS	2	.91	.02	.40
Experiment Task X Condition	3	.13	.00	.94
Experiment Task X ImpSS X Condition	6	.99	.06	.44
Error	94			

N = 200

Note: Experiment tasks = baseline task X gambling task

Table 14. *Effects of Experiment Task, ImpSS, and Condition on Levels of Pleasure for Females.*

Source	<i>df</i>	<i>F</i>	η^2	<i>P</i>
Between subjects				
ImpSS	2	3.83	.09	.03
Condition	3	1.00	.04	.40
ImpSS X Condition	6	1.29	.09	.27
error	80			
Within subjects				
Experiment Task	1	16.30	.17	.00
Experiment Task X ImpSS	2	1.57	.04	.22
Experiment Task X Condition	3	.30	.01	.83
Experiment Task X ImpSS X Condition	6	.50	.04	.81
error	80			

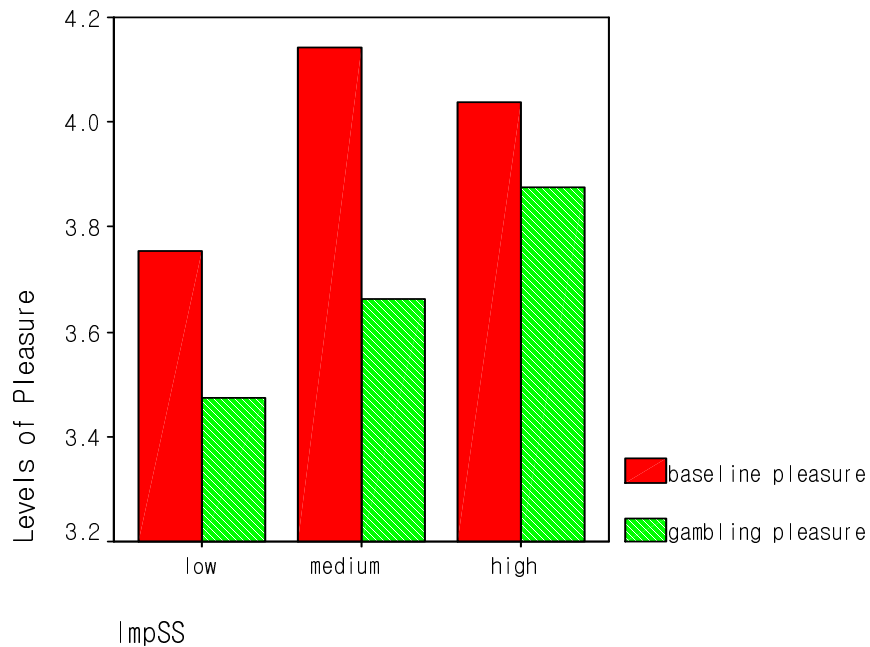
N = 200

Note: Experiment tasks = baseline task X gambling task

4.6.2. Main Effects of ImpSS and Experiment Condition on Levels of Pleasure

As shown in Table 14, ImpSS is found to have significant main effect on ImpSS for female subjects [$F(2, 80) = 3.83, p < .05$]. The Bonferroni test for this group suggests that HSS subjects ($M = 3.96, SD = .10$) report greater levels of posttest pleasure than LSS subjects ($M = 3.61, SD = .10$) (see Figure 3). Although the present study did not find significant main effects of treatment conditions, mean data suggest both men and women report the greatest levels of pleasure after playing slots with faster speed and normal duration. Further, both males [$F(1, 94) = 13.98, p < .01$] and females [$F(1, 80) = 16.30, p < .01$] report significantly lower than baseline pleasure after slot playing across conditions (Males: baseline pleasure $M = 3.90, SD = .61$, gambling pleasure $M = 3.63, SD = .64$; Females: baseline pleasure $M = 3.98, SD = .60$, gambling pleasure $M = 3.65, SD = .62$).

Figure 3. Main effect of ImpSS on levels of pleasure for female subjects



4.7. Hypothesis Testing – Hypothesis Three

Hypothesis three is focused on the effects of ImpSS (HSS, MSS, vs. LSS subjects) and treatment conditions (i.e., reel speed and spin duration) on self-reports of dominance factor of emotion. As with previous hypotheses, data were split by gender and analyzed separately. Analysis of Variance (ANOVA) is utilized to test the research hypothesis.

Contrary to expectations, the results of the study reveal that there are no significant interaction effects between ImpSS and reel speed on subjects' levels of dominance for either male or female study participants (see Table 15). Likewise, the prediction that subjects' levels of dominance vary as functions of ImpSS and spin duration is also not supported here for either gender cohort (see Table 15). Further, the

current study did not find any significant main effects of ImpSS and treatment conditions on dominance (see Table 15).

Table 15. *Effects of ImpSS and Condition on Levels of Dominance.*

Variable	Levels of Arousal (F-values)	
	Male	Female
ImpSS	.33	.14
Condition	.41	.89
ImpSS X Condition	.14	.73

$N = 200$

* $p < .05$

** $p < .01$

Figure 4. *Main effect of treatment condition on levels of dominance for male subjects*

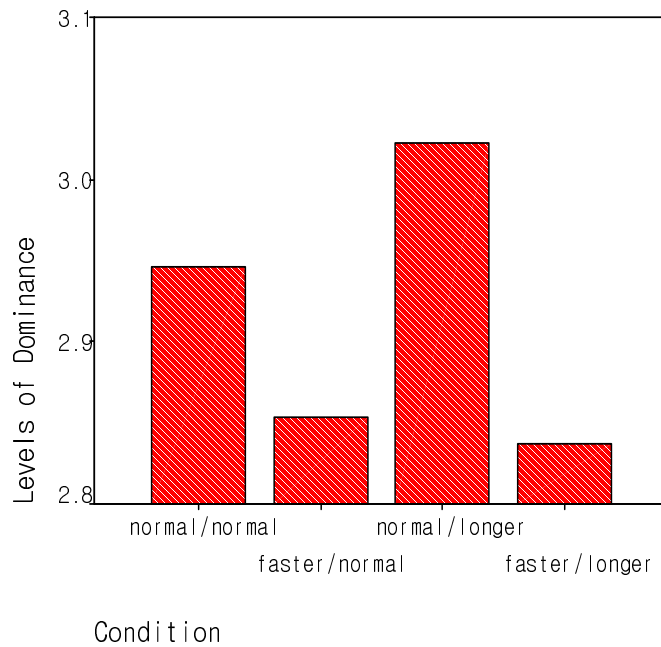
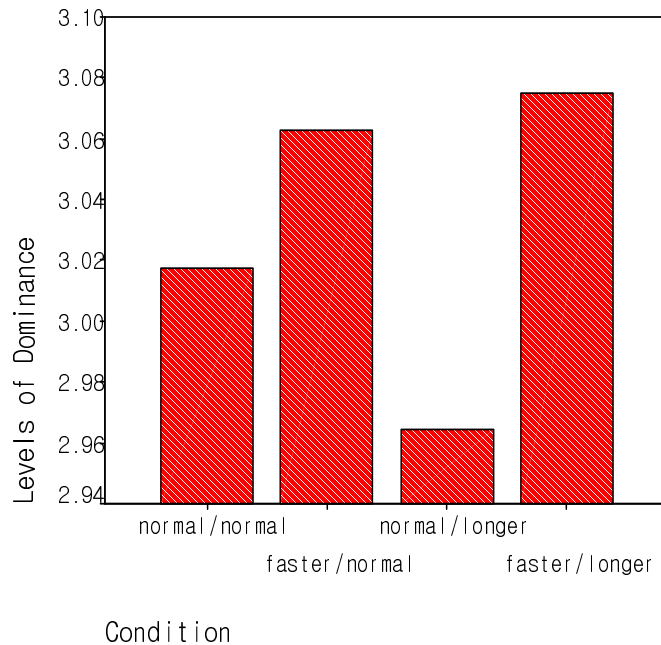


Figure 5. Main effect of treatment condition on levels of dominance for female subjects



4.8. Post Hoc Test – Effects of Winning Sequence and Experiment Condition.

A 3 (winning sequence) X 4 (visual stimulation) ANCOVA, with GABS as covariate, reveals that there is a significant main effect of winning sequence on Dominance [$F(2, 186) = 4.77, p < .05$]. As mentioned earlier, winning was randomized in the current study so that subjects played one of six possible winning sequences including: near miss, loss, win; near miss, win, loss; loss, near miss, win; loss, win, near miss; win, near miss, loss; or win, loss, near miss. Subjects were then grouped by winning sequence (i.e. near miss-win; win-near miss; win and near miss separated by loss) in order to test if there is a significant influence of winning sequence on emotional responses.

Table 16. *Effects of Condition and Winning Sequence on Levels of Dominance.*

Variable	Levels of Arousal (F-values)
GABS	.01
Condition	.70
Winning Sequence	4.77*
Condition X Winning Sequence	1.40

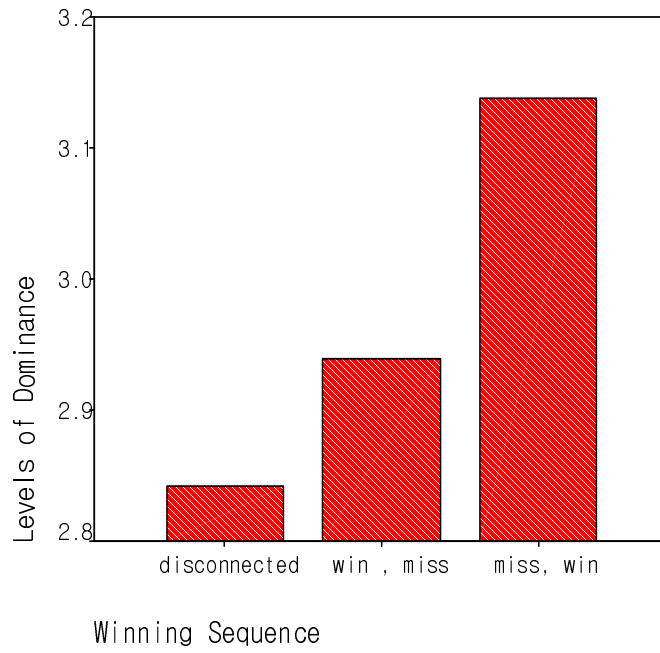
$N = 200$

* $p < .05$

** $p < .01$

The data analysis reveals that there is no significant influence of winning sequence on levels of arousal or pleasure. However, the ANCOVA results indicate that subjects report the greatest levels of dominance in a near miss-win condition, followed by a win-near miss condition, while lowest dominance was found in a condition where win and near miss are separated by a loss (see Table 16). A post hoc test using Bonferroni shows that subjects reported significantly higher dominance levels after playing a near miss-win condition ($M = 3.14$, $SD = .07$) than after playing a condition where a win and a near miss are separated by a loss ($M = 2.84$, $SD = .07$) (see Figure 6).

Figure 6. Main effects of winning sequence on levels of dominance



CHAPTER V

Discussion

Building upon research literature on hedonic consumption and video games (Holbrook et al., 1984), as well as studies on OSL, personality and gambling (Dowling et al., 2005; McDaniel & Zuckerman, 2003; Zuckerman, 1994), the current study assesses the influence of individual (personality: SS) and group (gender) differences on subjects' emotional responses to visual manipulations in slot machine gambling. The results of the study and its limitations are discussed in the following chapter, as are possible directions for future research.

5.1. Discussion of the study results

5.1.1. Influence of SS on PAD

The current investigation answers a call by Holbrook et al. (1984), to examine the potential influence of individual difference variables and certain facets of leisure stimuli on emotion. Research on hedonic consumption and other areas of psychology suggest that personality can moderate consumers' emotional responses to visual stimuli, such as those found in video games (Holbrook et al., 1984; Loba et al., 2002). Consequently, it was hypothesized that SS levels, of subjects in the current study, would moderate the effect of visual stimuli on their arousal levels. Contrary to the above expectations, however, the repeated-measures ANOVA results did not support significant interaction effects of SS categories and manipulations of visual stimuli on participants self-reports of the three dimensions of emotion (PAD) utilized to gauge gambling response.

Further, from a theoretical standpoint, people with a higher need for stimulation should prefer higher arousal from external stimuli, given that individuals' OSL has been established as definitively correlated with individuals' response to their environment (Raju, 1980; Zuckerman, 1994). Therefore, it was expected that HSS participants would score higher on P than MSS and LSS respondents when exposed to visually stimulating conditions (such as the faster and/or longer reel spins in this study); however, this was not the case here as illustrated in Tables 13 and 14. Likewise, results of the current study did not indicate significant interaction effects between SS and experiment conditions for either A (see Table 11 & 12) or D (see Table 15) dimensions of personality. The findings for P and D are not in line with those of Holbrook et al. (1984), who report the moderating effects of personality (visualizing/verbalizing tendency) on the latter dimensions of emotional response, to features of a computer-simulated rocket landing game. Counter to their results, however, the significant main effects of personality in the current study suggest that types of consumers (e.g., HSS groups) do respond more favorably to certain leisure activities (in this case, video slots) than others (e.g., MSS and/or LSS groups) in their gender cohort.

Based on the above results, the next step for research is to ask whether the single visual feature used in the study (i.e., reel spin) was strong enough to allow detection of statistically significant differences in emotional response between SS levels. For instance, although the current study responds to calls to examine the influence of individual slot machine features (Dowling et al., 2005), previous studies that find significant influence from video gambling machines, similar to slots, often

employ a combination of video and audio stimuli that arguably confound interpretation of how specific features effect users (cf. Loba et al., 2002). Consequently, future studies should replicate and extend the current design by investigating the potentially additive individual effects of reel spin, with other specific visual features (e.g., a flashing light) and/or audio characteristics (e.g., a bell or music) of slots. Such an approach may provide a better understanding of emotional responses to specific gambling stimuli and if/how the SS trait might moderate their effects. Such work could ultimately be useful in an understanding of disordered gambling and public policy related to machine design regulations (Loba et al., 2002).

In addition, the failure to find significant interaction effects between SS and visual stimuli herein could, in part, be explained by issues related to the “sensitivity” of the SOGS (see Appendix 1). The current study employs SOGS to respond to calls for investigating social gamblers’ behavior (Dickerson & Baron, 2000). Given SOGS is primarily designed to diagnose gambling pathology its use was helpful here, to eliminate potentially problem gamblers from the study. However, it appears the scale may not be sensitive enough to assess the various dynamics of social gambling, since most items in SOGS relate to the negative consequences associated with gambling, such as being in debt (Strong et al., 2004; Battersby et al., 2002). Strong et al. (2004) argue that SOGS is not sensitive enough to assess preclinical engagement in gambling and less severe gambling-related problems. Thus, a more suitable diagnostic might be needed for future research on social gamblers.

In retrospect, given that SOGS’ strong suit is detecting pathological gambling, it might be a less-than-ideal scale, when dealing with a wide range of social gamblers,

who range from at-risk gamblers ($n = 10, 5\%$) to those who rarely participate in gambling activities ($n = 3, 1.5\%$). In addition to variance in gambling frequency levels (see Table 2), the study data also suggest a fair degree of disparity in the number of gambling forms (Range = 1 to 12, $M = 4.99, SD = 2.64$) that subjects report participating in over the past 6 months. This wide distribution in variety of gambling forms is not typically found in studies on pathological gamblers, who often participate exclusively in one form of gambling (Dickerson, 1993). Thus, the variance between different levels of social gambling in the current study may in some way function to suppress the moderating effect of subjects' need for stimulation on emotional responses to visual stimulation manipulations. Therefore, the potential differences in the psychology and behaviors of social gamblers should continue to be explored in future research.

An additional explanation for the failure to find significant interaction effects between SS and visual stimuli here may also be a function subjects' past experiences with slot machines. As shown in Table 2, only 53% of subjects ($n = 107$) report that they had played slot machines over the past 6 months prior to the study, and the percentage is even lower for female participants (males = 59%; females = 47%) ($t = 1.98, df = 195, p < .05$). It is possible that subjects' prior emotional experiences with slot machines (or lack thereof) somehow affected their responses to the slot stimuli in the current experiment (Isen & Patrick, 1983; Dickerson & Adcock, 1987). For instance, the effects of visual stimuli on arousal and pleasure might have been mitigated for those who experienced extreme emotions in the past from slot playing. Further, according to SS theory, reactions to environmental stimuli differ depending

on the novelty of the stimulus; consequently, there might be differences in terms of emotional response between those who had prior experiences with slots and those who did not, and this needs to be investigated in future studies.

Lastly, the incentive method used here may be a possible reason for the lack of any apparent moderating influences of SS on emotional responses to visual stimulation (Gupta & Derevensky, 1996; Powell et al., 1999). The lack of serious financial risk for subjects in the current research could have confounded its results, as subjects played the computer-mediated slot machine with credits supplied by the researcher and not with their own money. Likewise, the incentive method, where participants have the option of winning prizes, was employed herein (Powell et al., 1999), due to ethical constraints in using human subjects in the U.S. Given the lack of true personal financial risk to subjects, SS groups may have registered positive emotion across all conditions, with minimal difference across the strata (cf. Anderson & Brown, 1984; Dickerson & Adcock, 1987). Consequently, the issue of ecological validity in lab-based research on gambling, where the realistic effects of financial risk are arguably impossible to simulate in the U.S., may be a serious impediment to our understanding of certain aspects of gambling phenomena (Leary & Dickerson, 1985). However, not all gambling websites or off-the-shelf casino video games involve financial (and represent a different form of hedonic consumption); thus, it would seem that the design and stimuli in the current study may be better suited to generalize to the latter context.

While there have been plenty of efforts to examine the relationship between gamblers' relative need for stimulation and gambling behaviors, such as chasing,

interest, preference, and intention (Breen & Zuckerman, 1999; Coventry & Constable, 1999; McDaniel & Zuckerman, 2003; Wolfgang, 1988), the current study is one of the first attempts to examine moderating effects of SS on response to certain features of slot machines. In sum, the current study did not find a significant moderating influence of SS on emotional responses to visual stimuli under the circumstances of: strength of experimental treatments, sampling issues (e.g., utility of SOGS and subjects' past experience in slots), and ethical constraints relative to using subjects' own money. However, the present study did find that overall levels arousal (for male subjects) and pleasure (for female subjects) varied significantly as a function of the main effects of need for stimulation, dependent upon gender (which is discussed below).

5.1.2. Influence of Gender on PAD

The research hypotheses (H1, H2, & H3) were tested separately by gender in an attempt to examine whether there were different patterns in main/interaction effects of SS and visual stimuli between males and females. Further, as mentioned in chapter 4, the present study examined the hypotheses independent of a gambling interest covariate, since GABS was found to be related to both ImpSS and gender. Although the current study did not find any significant personality (SS) by treatment (visual stimulation) interactions (H1, H2, & H3), SS was found to have significant main effects on certain emotional responses, depending on gender (see Table 10 & 11). For example, it was predicted (H1) that gamblers' propensity for SS, or their need for stimulation, would be positively associated with their self-reported measures of arousal. This prediction is partially supported by the data for the males in the study, in that the HSS males reported significantly higher arousal levels than their MSS

counterparts (see Figure 1). Further, the expectation (H2) that SS is positively related to levels of pleasure is also partially supported for female subjects (see Figure 3), as those designated HSS reported significantly higher levels of pleasure than LSS females. However, the current study did not find significant main effects of SS on levels of dominance (see Table 15). The findings on the main effect of SS for certain emotions (i.e., arousal and pleasure) are in line with previous studies on gambling, personality, and gender, which suggest that the relationship between gambling phenomena (e.g., gambling preferences) and SS also differs by gender (McDaniel & Zuckerman, 2003; Wolfgang, 1988).

Given that hypotheses were tested in separate analyses for males and females, the current study did not actually test for gender differences in emotional responses to visual stimuli. Interestingly, however, consistent with predictions, the results reported herein reveal that males and females show differential patterns in emotional response, within each experimental condition as mentioned above. As shown in Figure 2, male subjects in the faster speed/longer duration condition report a significantly higher level of arousal than male subjects in normal speed/normal duration and faster speed/longer duration conditions, while baseline levels of arousal were not significantly different between treatment conditions for either males and females (see Table 7). Further, male subjects in the normal speed/normal duration condition reported significantly higher levels of arousal than male participants in the faster speed/longer duration condition (see Figure 2). On the contrary, females who played slots in faster speed/normal duration and normal speed/longer duration reel spin conditions report higher levels of

arousal than females in the other two treatment conditions, even though the differences between treatment conditions were not significant (see Table 11).

With regard to posttest levels of pleasure, males in faster speed/normal duration and a normal speed/longer duration condition reported a higher level of pleasure than males in the other two treatment conditions. On the contrary, females who played a faster speed/normal duration game reported higher on measures of pleasure than females in the other three experiment conditions. However, the main effects of treatment condition on pleasure levels were not significant for either males or females in the study.

Further, patterns of means show males, who played either a normal speed/normal duration game or a normal speed/longer duration game, reported a higher level of dominance (see Figure 4). Meanwhile, females, who played a normal speed/normal duration game and a faster speed/longer duration game, reported a high level of dominance (see Figure 5), though the differences among treatment conditions were not significant for either sex (see Table 15). Data related to females' responses are especially noteworthy since some argue that slot machines are more popular among women (Delfabbro, 2000). Although, data in the current study show that the proportion of male participants that report playing slots in the past 6 months are slightly higher than for females (is there a table for this). Slots experience data in the current study could also be age and region dependent (Petry, 2003).

In sum, the current study adds to the body of gambling literature by examining gender differences with regard to interaction effects between SS and certain characteristics of slots (i.e., reel spin). In doing so, it responds to calls for gambling

research that is not sexist in its approach to focusing on males and ignoring the female demographic (Dickerson & Baron, 2000). Gender results reported herein are consistent with McDaniel and Zuckerman (2003)

Although the relationship between SS and consumers' slot preferences and behaviors remains unclear, it should be pointed out that slot machines have been argued to be more visually stimulating than other forms of gambling (Griffiths, 1993; 1995). Thus the present study contributes to gambling literature by revealing that subjects' levels of arousal differ as a function of visual stimuli (e.g., main effects of treatment condition). Moreover, the current study provides information on how manipulating sensory features in slot machines (i.e., faster reel spin & longer spin duration) can influence the user's emotions (Dowling et al., 2005).

5.1.3. Influence of Winning Sequence on PAD

The current study attempts to control for the winning effect on subjects' emotional responses by exposing all subjects to a win, a loss, and a near-miss, and by randomizing the winning sequence in order to minimize ordering effects. Although not hypothesized, post-hoc analyses find that the winning sequence did in fact influence subjects' level of perceived dominance (See Figure 6), while finding no significant effect of winning sequence on arousal and pleasure. While it has been suggested that winning and near misses influence behaviors during slot playing (Kassinove & Schare, 2001; Coventry & Constable, 1999), the current study finds that the sequence of wins and near misses might also influence subjects' emotions. The mean data reveal that study participants report significantly greater levels of perceived dominance following exposure to a sequence that linked a win and a near miss, while the lowest dominance

score is found in conditions where a win and near miss were separated by a loss (see Figure 6). Further, it is found that subjects reported significantly higher dominance levels when a near miss was followed by a win than when a near miss and a win was separated by a loss (see Figure 6). This finding is in line with Ladouceur et al. (2003), who suggest that winning expectancy is related to near-miss and win combinations and subsequent emotions. However, more work needs to be done in this area to substantiate the results in the current work.

5.2. Limitations

The current study is grounded in existing research on gambling and consumer psychology in terms of its research objectives, design, and use of psychometrically sound measures (cf. Christopherson & Weatherly, 2006; Dickerson & Adcock, 1987; Dowling et al., 2005; Holbrook et al., 1984; MacLin et al., 1999; McDaniel & Zuckerman, 2003; Mehrabian, 1995; Powell et al., 1999; Weatherly & Brandt, 2004). However, as with most social science research, it has certain limitations, which should be noted. For example, in terms of generalizability, the study was conducted with a sample of college students from one region of the country: College Park, Maryland. Thus, the results of the study may not be generalizable to college students in other areas. In addition, it is hard to apply the results of the current research to other groups, such as non-college student populations. Moreover, because the participants were social gamblers, the findings cannot be generalized to pathological gamblers; although, Dickerson (1993) argues that focusing on the broader spectrum of gambling behavior, such as social gamblers, can ultimately help to inform our understanding of the former. Moreover, since all study participants were volunteers, who were compensated for

their time with extra course credits, there might be the possibility that certain personality types or characteristics would be more likely to take part in this study for the incentive than others. Moreover, a little over half of all participants reported that they had played slot machines before (see Table 2). Thus, prior experience in slot-machine gambling might have influenced emotional responses for the slight majority of the sample.

In addition to limitations resulting from sampling procedures, the types of measures used in the current study may constitute certain limitations. For example, the researcher gathered all personality variables and gambling behaviors through self-report measures, which present potential respondent biases, including social desirability and random response. Participants' random responses may be created due to a large number of items (i.e., over 150 questions) on a questionnaire which takes about 20 to 25 minutes to complete (Wood, Nosko, Desmarais, Ross, & Irvine, 2006). Nevertheless, it is expected that the anonymity of participant responses involved in the study functioned to lessen the above biases.

While every attempt has been made to make the computerized slot program realistic compared to similar video games, the experimental setting has limitations in terms of its applicability to other contexts. For instance, given the differences between computer-mediated slot machines and slot machines in casinos (e.g., using a mouse and/or watching a computer screen in a controlled environment), the findings of the current study might not be generalized to the latter settings (See Appendix 15). Further, while the use of the incentive method adds a certain element of financial risk to subjects' gambling experience, it is not likely to offer the same arousal potential as

wagering one's own money. Thus, the present study's findings might not be generalized to actual online gambling experiences, where people have the possibility of suffering personal monetary loss. However, the current study might provide some insights into certain types of computer-mediated gambling forms, where financial risk is not involved (e.g., video games and free on-line gambling sites). The incentive method might also have lead to higher levels of pleasure for study participants, from the combination of the minimal risk it asks of subjects and the possibility of them winning a prize for such minimal risk. Also, the fact that participants were only allowed to play the game three times constitutes a limitation, as longer playing time might result in a greater chance for subjects' to invest cognitive and affective resources in the game. As it stands, the current process of slot exposure might not have been enough to fully stimulate participants or accurately gauge their emotional reactions. The current study manipulated baseline arousal and pleasure levels by using soothing pictures, music, and magazines so that all participants would have low arousal levels and positive levels of pleasure. However, gamblers' emotional states may vary in real gambling settings. For instance, those who come back to a casino to compensate for their lost money may not always have positive emotions prior to gambling. Thus, it may be fruitful to examine whether subjects' different emotional states (e.g., positive/neutral/negative) prior to gambling participation interact with personality traits to influence other gambling behaviors (such as approach/avoidance).

5.3. Implications for Future Research

The current investigation responds to calls for research regarding the heterogeneity of gambling forms by identifying the effects of unique features in slot

machines (Dickerson, 1993; Dickerson & Baron, 2000; McDaniel & Zuckerman, 2003; Griffith, 1999). Researchers suggest that the visual effects of slot machines are distinctive characteristics that can serve as a source of arousal (Dowling et al., 2005). For that reason, there has been a need to examine the relationship between gamblers' levels of visual stimulation and their OSL, which in turn may help identify factors that influence certain individuals' preferences for slot machines (Griffith, 1999). Although there have been efforts to examine the influence of the structural characteristics of slot machines on gambling behaviors (cf. Christopherson & Weatherly, 2006; Ladouceur & Sevigny; 2002; Loba et al., 2002; Sharpe et al., 2005), the present study is the first known work to attempt to examine the potential effects of certain visual elements of slot machines' in isolation, while also consider gamblers' need for stimulation and gender.

The current study examines the emotional responses during slot playing, in response to suggestions that affect plays an important role in hedonic consumption (Holbrook & Hirschman, 1982; Holbrook et al., 1984; Wakefield and Barnes, 1996). Further, this study is based on the notion that gambling is a form of experiential consumption and a playful leisure activity, which is not necessarily pathological (Abt et al., 1984). As such, it extends Holbrook et al. (1984) by investigating the influence of individual's need for stimulation (SS) and gender on emotional responses (PAD) to visual stimuli (reel spin) during slot playing. In addition, the present work responds to calls for investigation of social gambling, which may help, prospectively, explain pathological gambling (Dickerson & Baron, 2000). The current research suggests several avenues for future studies on the relationship between individual's need for

stimulation and emotional responses to other audio/video effects of slot machines. While this experiment focused on reel speed and spin duration, other visual effects associated with slot machines also may be associated with gamblers' sensory arousal (Griffiths, 1995; Dowling et al., 2005). For instance, SS may moderate the relationship between emotional responses and other types of visual stimuli such as lighting, ambience, and color (Griffiths, 1995). Likewise, investigating the influence of SS on emotional responses to audio effects may help foster a better understanding of slot machine players, since machine-related audio stimuli also may serve as sources of sensory stimulation (Dowling et al, 2005; Griffiths, 1995).

Future researchers could also look at the effects of other features besides the risk element and the winning effect, in other gambling forms, to see if those elements influence emotions in a similar fashion. For instance, gambling behaviors may be influenced by the speed of the roulette wheel or the colors of a scratch-off game, all of which might feed the need for stimulation. Additional research employing other measurements of emotion is also needed. Although PAD is a common measure of emotion, several limitations related to that scale have been identified, including the ambiguity of verbal scales, the inefficiency of responses, bias in terms of language and culture, and its relatively lengthy nature (Morris, 1995). Thus, future research may also use both PAD and other measures of emotion such as the Self Assessment Manikin (SAM; Morris, 1995), which can be used as a supplementary measure of emotion. Conversely, employing models of basic emotions (as opposed to the dimensional model used here) might prove a more fruitful avenue to investigate gambling response. Lastly, physiological measures, including eye-gaze, heart rate, and

hormones (e.g., cortisol) can extend our understanding of the relationship between gambling and visual stimuli, as those measures can reduce bias and subject error (Meyer et al., 2000; Sharpe et al., 1995).

In conclusion, the data in the current work failed to support the existence of a moderating effect of SS on emotional response to visual stimuli in a computer-mediated slot machine. However, the data partially support the notion that HSS individuals show higher levels of arousal (for males) and pleasure (for females). Further, subjects' levels of arousal differ as a function of visual stimuli (for males), while winning sequence influences levels of dominance. Based on this investigation, researchers may continue to examine social gambling, which may, in turn, help understand pathological gambling. Further, given that it was a one of the first attempts to examine the influence of personality (SS) on emotional responses to certain types visual characteristics (reel spin), investigating other individual difference variables, cognitive responses (e.g., illusion of control), and other types of stimuli (audio effects & other types of visual stimuli) may also broaden our knowledge of slot behaviors (and potential psychological differences across participation in other gambling forms).

Appendix 1
South Oaks Gambling Screen (SOGS)
Lesieur & Blume (1993)

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

	Not at all	Less than once a week	once a week or more	
a.	1	2	3	play cards for money
b.	1	2	3	bet on horses, dogs, or other animals (at OTB, the track, or with a bookie)
c.	1	2	3	bet on sports (parlay cards, with a bookie, or at Jai Alai)
d.	1	2	3	played dice games (including craps, over and under, or other dice games) for Money
e.	1	2	3	gambled in a casino (legal or otherwise)
f.	1	2	3	played the numbers or bet on lotteries
g.	1	2	3	played bingo for money
h.	1	2	3	played the stock, options, and/or commodities market
i.	1	2	3	played slot machines, poke machines, or other gambling machines
j.	1	2	3	bowled, shot pool, played golf, or some other game of skill for money
k.	1	2	3	pull tabs, or "paper" games other than lotteries
l.	1	2	3	some form of gambling not listed above please specify _____

68. What is the largest amount of money you have ever gambled with on any one day?

- | | |
|-----------------------------------|--|
| _____ never have gambled | _____ more than \$100 up to \$1,000 |
| _____ \$1 or less | _____ more than \$1,000 up to \$10,000 |
| _____ more than \$1 up
to \$10 | _____ more than \$10,000 |
| _____ more than \$10 up to \$100 | |

69. Check which of the following people in your life has (or had) a gambling problem
 _____ father _____ mother _____ brother or sister _____ grandparent
 _____ my spouse/partner _____ my child(ren) _____ another relative

_____ a friend or someone else important in my life

70. When you gamble, how often do you go back another day to win back money you lost?

- _____ never
- _____ some of the time (less than half the time I lost)
- _____ most of the time I lost
- _____ every time I lost

71. Have you ever claimed to be winning money gambling but weren't really? If fact, you lost?

- _____ never (or never gamble)
- _____ yes, less than half the time I lost
- _____ yes, most of the time

72. Do you feel you have ever had a problem with betting money or gambling?

- _____ no
- _____ yes, in the past but not now
- _____ yes

73. Did you ever gamble more than you intend to? _____yes _____no

74. Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true? _____yes _____no

75. Have you ever felt guilty about the way you gamble or what happens when you gamble? _____yes _____no

76. Have you ever felt like you would like to stop betting money or gambling but didn't think you could? _____yes _____no

77. Have you ever hidden betting slips, lottery tickets, gambling money, I.O.U.s, or other signs of betting or gambling from your spouse, children, or other important people in your life? _____yes _____no

78. Have you ever argued with people you live with over how you handle money? _____yes _____no

79. (If you answered yes to question12): Have money arguments ever centered on your gambling? _____yes _____no

80. Have you ever borrowed from someone and not paid them back as a result of your gambling? _____yes _____no

81. Have you ever lost time from work (or school) due to betting money or gambling?
_____yes _____no

82. If you borrowed money to gamble or to pay gambling debts, who or where did you borrow from? (check "yes" or "no" for each)

	no	yes
a. from household money	()	()
b. from your spouse	()	()
c. from other relatives or in-laws	()	()
d. from banks, loan companies, or credit unions.	()	()
e. from credit cards	()	()
f. from loan sharks	()	()
g. you cashed in stocks, bonds, or other securities	()	()
h. you sold personal or family property	()	()
i. you borrowed on your checking account (passed bad checks)	()	()
j. you have (had) a credit line with a bookie	()	()
k. you have (had) a credit line with a casino	()	()

Appendix 2

Impulsive Sensation Seeking Scale (ImpSS)

Zuckerman, Kuhlman, Thornquist, & Kiers (1991)

Directions: If you **agree with** any of the following **statements** or decide that **it describes you, circle TRUE**. If you **disagree with** a statement **or feel** that it is **not descriptive of you, circle FALSE**. **Answer every statement** by **CIRCLING** either TRUE or FALSE, even if you are not entirely sure of your answer.

36. I tend to change interests frequently.

1. True 2. False

37. I like to explore a strange city or section of town by myself, even if it means getting lost.

1. True 2. False

38. Before I begin a complicated job or project, I tend to make careful plans.

1. True 2. False

39. I prefer friends who are excitingly unpredictable.

1. True 2. False

40. I sometimes like to do things that are a little frightening.

1. True 2. False

41. I often get so carried away by new and exciting things and ideas that I never stop to consider possible complications.

1. True 2. False

42. I will try anything once.

1. True 2. False

43. I tend to start a new task or project, without much advance planning on how I will do it.

1. True 2. False

44. I tend to enjoy "wild" uninhibited parties.

1. True 2. False

45. I would like the kind of life where I am on the move and traveling a lot, with lots of change and excitement.

1. True 2. False

46. I am generally an impulsive person.

1. True 2. False

47. I like to have new and exciting experiences and sensations even if they might be a little scary to me.

1. True 2. False

48. I sometimes do "crazy" things just for fun.

1. True 2. False

49. I very seldom spend much time on the details of planning ahead.

1. True 2. False

50. I would like to take off on a trip with no preplanned or definite routes or timetable.

1. True 2. False

51. I enjoy getting into new situations where I can't predict how things will turn out.

1. True 2. False

52. I usually think about what I am going to do before I do it.

1. True 2. False

53. I like to do certain things just for the thrill of it.

1. True 2. False

54. I tend to do things on impulse.

1. True 2. False

Appendix 3
Gambling Attitudes and Beliefs Survey (GABS)
Breen & Zuckerman (1994)

For questions 1 thru 35, please write in the number below that best describes the way you feel:

(1) strongly agree; (2) agree; (3) neutral ; (4) disagree; (5) strongly disagree

1. Gambling makes me feel really alive. ____
2. If I have not won any of my bets for a while, I am probably due for a big win. ____
3. There's not way I can know if I will have good or bad luck. ____
4. I respect a person who makes very large bets and remains calm and cool. ____
5. Sometimes I forget about the time when I am gambling. ____
6. I know when I'm on a streak. ____
7. When I gamble it is important to act as if I am calm, even I am not. ____
8. Some people are unlucky. ____
9. I feel great when I win a bet. ____
10. It is important to feel confident when I'm gambling. ____
11. Gambling is boring. ____
12. Some people are lucky to have around when I'm gambling. ____
13. People who gamble are more daring and adventurous than those who never gamble. ____
14. I don't like to quit when I'm losing. ____
15. It takes some skill to be successful at craps. ____
16. Sometimes I just know I'm going to have good luck. ____
17. People who make big bets can be very sexy. ____
18. If you have never experienced the excitement of making a big bet, you have never really lived. ____
19. No matter what the game is, there are betting strategies than can help you to win. ____
20. I have carried a lucky charm when I gambled. ____
21. If I lose at gambling, it is important to act calm. ____
22. I usually don't get very excited when I gamble. ____
23. Roulette takes more skill than playing the lottery. ____
24. Casinos are glamorous, exciting places. ____
25. if I have been lucky lately, I should press my bets. ____
26. I feel angry when I lose at gambling. ____
27. If I were feeling down, gambling would probably pick me up. ____
28. I must be familiar with a gambling game if I am going to win. ____
29. Some people can bring bad luck to other people. ____
30. It's important to act a certain way when I win. ____
31. If I lose, it is important to stick with it until I get even. ____
32. To be successful gambling, I must be able to identify streaks. ____
33. If I have lost my bets recently, my luck is bound to change. ____
34. It's important to be gracious winner. ____

35. I like gambling because it helps me to forget my everyday problems. ____

Appendix 4
Brief Sensation Seeking Scale (BSSS)
Hoyle, Stephenson, Palmgreen, Lorch, Donohew (2002)

Directions: Please respond to the following questions by **circling one NUMBER** at the point **on each scale**, which is **closest to** reflecting **your level of agreement** with each statement:

100. I would like to explore strange places
Strongly Disagree 1 2 3 4 5 *Strongly Agree*
101. I get restless when I spend too much time at home
Strongly Disagree 1 2 3 4 5 *Strongly Agree*
102. I like to do frightening things
Strongly Disagree 1 2 3 4 5 *Strongly Agree*
103. I like wild parties
Strongly Disagree 1 2 3 4 5 *Strongly Agree*
104. I would like to take off on a trip with no pre-planned routes or timetables
Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*
105. I prefer friends who are excitingly unpredictable
Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*
106. I would like to try bungee jumping
Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*
107. I would love to have new and exciting experiences, even if they are illegal
Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Appendix 5
Perceived Complexity
Holbrook, Chestnut, Oliva, & Greenleaf (1984)

Directions: using each of the following seven pairs of words below, circle the number closest to how you felt for the game you played.

Redundant	1	2	3	4	5	Varied
Simple	1	2	3	4	5	Complex
Similar	1	2	3	4	5	Contrasting
Usual	1	2	3	4	5	Surprising
Homogeneous	1	2	3	4	5	Heterogeneous
Common	1	2	3	4	5	Rare
Familiar	1	1	3	4	5	Novel

Appendix 6
Pleasure-Arousal-Dominance Scale
Russell & Mehrabian (1974)

Directions: using each of the following eighteen pairs of words below, Circle the number closest to how you felt during your experience on the game you play today:

Pleasure						
Melancholic	1	2	3	4	5	Contented
Unhappy	1	2	3	4	5	Happy
Annoyed	1	2	3	4	5	Pleased
Unsatisfied	1	2	3	4	5	Satisfied
Bored	1	2	3	4	5	Relaxed
Despairing	1	1	3	4	5	Hopeful
Arousal						
Relaxed	1	2	3	4	5	Stimulated
Calm	1	2	3	4	5	Excited
Sluggish	1	2	3	4	5	Frenzied
Dull	1	2	3	4	5	Jittery
Sleepy	1	2	3	4	5	Wide-awake
Unaroused	1	1	3	4	5	Aroused
Dominance						
Controlled	1	2	3	4	5	Controlling
Influenced	1	2	3	4	5	Influential
Cared for	1	2	3	4	5	In control
Awed	1	2	3	4	5	Important
Submissive	1	2	3	4	5	Dominant
Guided	1	1	3	4	5	Autonomous

Appendix 7
Email protocol for On-line Survey Participation

Dear

You recently volunteered to help me with my dissertation research by participating in an online survey and a follow-up study. I appreciate your participation and help with my research.

Please read the following directions CAREFULLY and contact me if you have any questions.

1. The deadline for you to participate in the online survey is Saturday 12/02/06 at 11:59 p.m. After that time, the survey will be taken down.
2. It is important for you to complete the entire survey (and respond to all of the questions). It is important that you respond as openly and honestly as possible (and information that you provide will be kept confidential).
3. You should note that the online survey form is set up so that users can navigate the site by using the back/next button on the bottom of the survey. **DO NOT** use the back or forward button on the internet browser, as this will result in lost data. Please make a concerted effort to answer all questions on each page before you move onto the next.
4. The survey site is protected by the University of Maryland server for privacy purposes. You can only access the site by using your UMD directory ID and password).
5. Email me if you and/or they have any questions/concerns.

The online survey URL is
<http://cgi.umd.edu/survey/display?gamestudy/mainstudy2>

Choong Hoon Lim
Ph.D. Candidate
Department of Kinesiology
University of Maryland at College Park

Appendix 8

Experiment Instruction 1

We appreciate you participating in our research project. This phase of our study will take you approximately 20 minutes or less to complete. Below is a brief overview of what you will be helping us with today

- 1) First, we need you to read and sign the accompanying informed consent form. Please show us photo identification (to help us confirm that you are 18 or older and participated in the earlier online survey)
- 2) Next, you will be seated a table and be given some magazines to read and some headphones to listen to music, while the lab attendant prepares the first exercise for you to complete
- 3) After you have been seated for a few minutes, the lab attendant will come by and give you a detailed list of instructions, questions, and tasks to complete, while you remain seated and listening to the music that we have provided. It is important that you read all directions carefully (and complete all questions and exercises)
- 4) Finally, you will be seated in front of a computer monitor and be instructed on how to play a prototype of a computerized slot machine that we would like you evaluate. After playing, you will be given a brief a questionnaire to fill out and that will complete your session.
- 5) Given the nature of our study, it is important that we avoid any potential distractions in the rooms, such as talking or other noises. Therefore, we ask that you please make sure all cell phones, PDAs and pagers are turned off, while you are participating today. We also ask that you leave any bookbags, backpacks or purses in the waiting area.
- 6) If you need to use the restroom, please let the lab attendant know that you need to so now (as it will adversely affect our study if you have leave the room once the above 20 minute sequence has started). We appreciate your compliance with the above.

Appendix 9
Experiment Instruction 2

Print Name: _____

Subject ID # _____

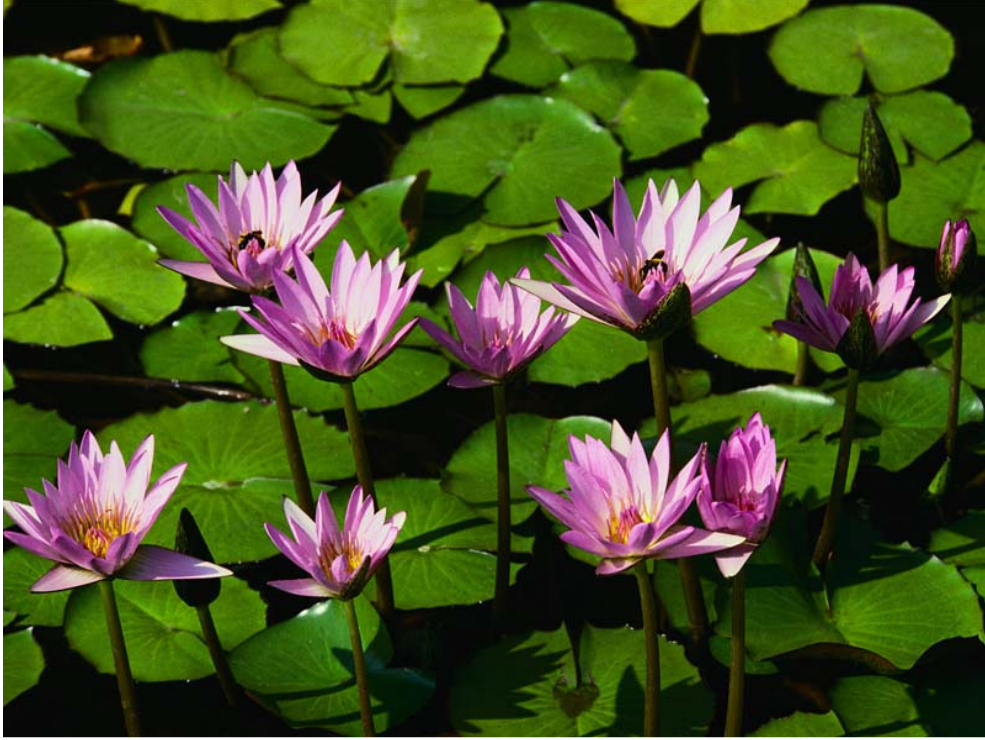
Date _____ / _____

INSTRUCTIONS:

Thank your for participating in our project today. In order to maintain the integrity of our study, we ask that you please wait quietly until the lab assistant is ready for you. While you are waiting, there are a few exercises on the following pages that we would like you to complete, while listening to the music we have provided (and we will be with you shortly). Please read and follow all directions carefully.

PLEASE TURN TO THE NEXT PAGE

Appendix 10
Landscape Picture 1



Appendix 11
Landscape Picture 2



Appendix 12

Experiment Instruction 3

In a few minutes, you will be helping us to evaluate a prototype of a video slot machine that we have created. This program has been designed to mimic those that you might find on the internet. Please take a moment to familiarize yourself with the rules/features of the game, including the winning combinations and associated payouts.

- As you play, you will see various symbols appear on the 3 reels of the computerized slot machine (e.g., colored fruits and bells). The winning combinations of these symbols (shown below) are presented on the top of the slot machine, along with associated payout values in virtual dollars.
- You will be staked **3** credits and each credit is worth \$1.00, so you will begin playing with \$3.00 total (which you will see in the window on the left of the slot machine). Each spin (or play) “costs” \$1.00 (or 1 credit).
- You will be given 3 spins (or 3 opportunities to win). Once all 3 reels have completely stopped, you can press the spin button to begin the next play (please do NOT press the spin button while reels are spinning).
- If, during any of your 3 spins, the combination of symbols on the 3 reels matches one of the 6 winning combinations shown below, you will see the payout value for that combination appear in the window on the right of the slot machine.



- Please note that the lights in the room will be dimmed in order to help you focus your attention on the slot machine, while you are playing the game.
- Once you have finished playing, the attendant will give you a brief questionnaire, where you will respond to survey items.

- The payouts for the winning combinations are shown in virtual dollars. The various dollar amounts correspond to prizes that we are offering, which are detailed on the next page. If during any of your 3 plays of the slot machine results in a winning combination (shown below), you will win the listed prize(s):

1000 1000 1000

The above combination means you win both of the following prizes:

1. Basketball
2. 1 pair of Sony Headphones



The above combination means you win your choice of the one of following prizes:

1. Basketball
2. 1 pair of Sony Headphones



The above combination means you win the following prize:

1. Basketball



The above combination means you win the following prize:

1. Basketball



The above combination means you win the following prize:

1. Basketball



The above combination means you win the following:

1. Your name will be entered 5 times into a drawing to win:
 - a. a pair of movie tickets
 - b. 1 of 5 pairs of movie tickets

Please remain seated and quiet, while you continue listening to the music. The lab attendant will be with you shortly.

Appendix 13

Experiment Instruction 4

In a moment, you will be playing a prototype of a video slot machine that has been designed to mimic those that you might find on the internet. Take a moment to familiarize yourself with the features of the game shown on the computer monitor, including the winning combinations and associated payout values.

- In order to help you focus your attention on the slot machine, the attendant has turned off the overhead lights.
- Please take note of the button at the bottom right of the machine marked "Spin," which *you will use to activate the slot machine by right clicking the mouse on it.*
- As you play, you will see various symbols appear on the 3 reels of the computerized slot machine (e.g., colored fruits and bells). The 6 winning combinations of these symbols are presented on the top of the slot machine, along with associated payout values in dollars
- You will be staked 3 credits and each credit is worth \$1.00, so you will begin playing with \$3.00 total (shown in the "Total Credits" window on the middle left of the slot machine). Each spin (or play) "costs" \$1.00 (or 1 credit)
- You will have 3 spins (3 opportunities to win). Once all 3 reels have completely stopped, you can press the spin button to begin the next play.
- Once the 3 reels have stopped spinning, you will see the payout value for that combination appear in the "Amount Won" window on the middle right of screen. The machine keeps a running total of your winnings.
- After you finish playing the slot machine, that attendant will turn on the overhead lights and give you a brief questionnaire, where you will respond to survey items.
- If you have any questions before you begin playing, please raise your hand and the experimenter will answer them for you.

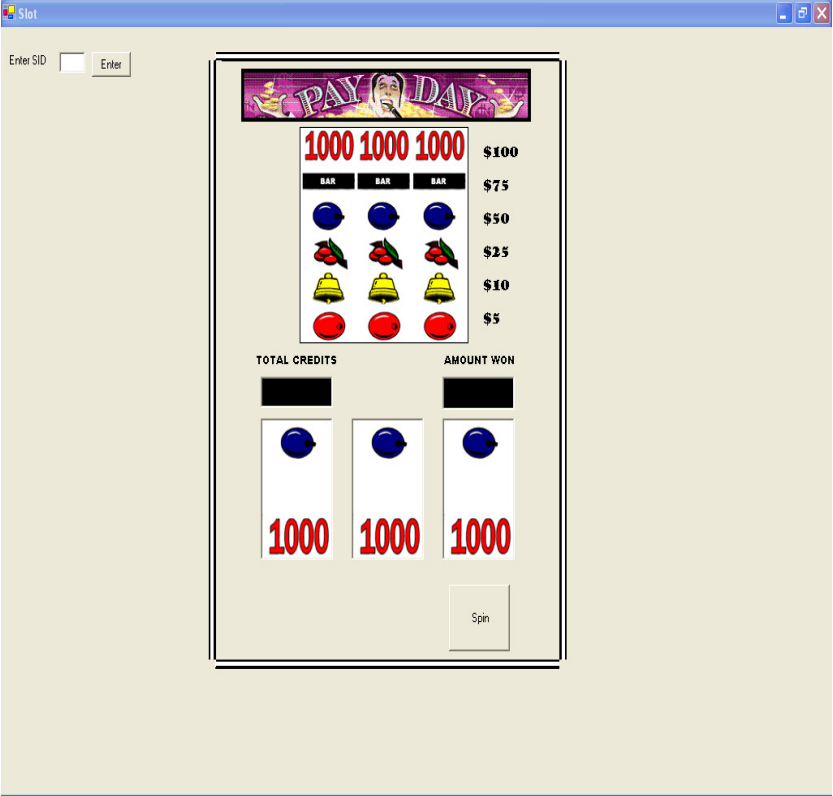
If you do not have any questions, hand this form to the attendant and then you will be given the mouse to begin playing the slot machine. The attendant will close the door

while you play. Please quietly open the door immediately after you have finished your 3rd and final turn.

Appendix 14
Experiment Permutations

	1st spin	2nd spin	3 rd spin	Speed	Duration
1	Near Miss	Loss	Win	Normal	Normal
2	Near Miss	Win	Loss	Normal	Normal
3	Loss	Near Miss	Win	Normal	Normal
4	Loss	Win	Near Miss	Normal	Normal
5	Win	Near Miss	Loss	Normal	Normal
6	Win	Loss	Near Miss	Normal	Normal
7	Near Miss	Loss	Win	Faster	Normal
8	Near Miss	Win	Loss	Faster	Normal
9	Loss	Near Miss	Win	Faster	Normal
10	Loss	Win	Near Miss	Faster	Normal
11	Win	Near Miss	Loss	Faster	Normal
12	Win	Loss	Near Miss	Faster	Normal
13	Near Miss	Loss	Win	Normal	Longer
14	Near Miss	Win	Loss	Normal	Longer
15	Loss	Near Miss	Win	Normal	Longer
16	Loss	Win	Near Miss	Normal	Longer
17	Win	Near Miss	Loss	Normal	Longer
18	Win	Loss	Near Miss	Normal	Longer
19	Near Miss	Loss	Win	Faster	Longer
20	Near Miss	Win	Loss	Faster	Longer
21	Loss	Near Miss	Win	Faster	Longer
22	Loss	Win	Near Miss	Faster	Longer
23	Win	Near Miss	Loss	Faster	Longer
24	Win	Loss	Near Miss	Faster	Longer

Appendix 15 Computer Simulated Slot machine



References

- Aasved, M. (2002). *The psychodynamics and psychology of gambling*. Springfield, IL: Charles C Thomas Publisher.
- Aasved, M. (2003). *The sociology of gambling*. Springfield, IL: Charles C Thomas Publisher.
- Abt, V., & Smith, J. F. (1983). One the social implications of commercial gambling: Is gambling just another form of play? *Arena Review*, 7(3), 17-28.
- Abt, V., McGurrin, M. C., & Smith, J. F. (1984). Toward a synoptic model of gambling behavior. *Journal of Gambling Behavior*, 1(2), 79-88.
- Anderson, G., & Brown, R. I. (1984). Real and laboratory gambling, sensation seeking and arousal. *British Journal of Psychology*, 75, 401-410.
- Anderson, G., & Brown, R. I. (1986). Some applications of reversal theory to the explanation of gambling and gambling addictions. *Journal of Gambling Behavior*, 3(3), 179-189.
- Apter, M. J. (1982). *The experience of motivation: The theory of psychological reversal*. London: Academic Press.
- Arnett, J. (1994). Sensation seeking: A new conceptualization and new scale. *Personality and Individual Differences*, 16(2), 289-296.
- Back, J., & Lee, C. (2005). Resident's perceptions of casino development in Korea: The Kangwon Land casino case. *UNLV Gaming Research & Review Journal*, 9(2), 45-53.
- Bagozzi, R. P., Gopinath, M., & Nyer, P. U. (1999). The role of emotions in marketing. *Journal of the Academy of Science*, 27(2), 184-206.
- Barnes, G. M., Welte, J. W., Hoffman, J. H., & Dintcheff, B. A. (1999). Gambling and alcohol use among youth: Influences of demographic, socialization, and individual factors. *Addictive Behaviors*, 24(6), 749-767.
- Battersby, M. W., Thomas, L. J., Tolchard, B., & Esterman, A. (2002). The south oaks gambling screen: A review with reference to Australian use. *Journal of Gambling Studies*, 18(3), 257-271.
- Berlyne, D. E. (1960). *Conflict, arousal, and Curiosity*. New York: McGraw-Hill.

- Berkowitz, W. R. (1967). Use of the sensation-seeking scale with Thai subjects. *Psychological Reports, 20*, 635-641.
- Bjork-Akesson, E. (1990). Measuring sensation seeking. *Goteborg Studies in Educational Sciences, 75*. Goteborg, Sweden: Acta Universitatis Gothoburgensis.
- Blaszczynski, A. P., Wilson, A. C., & McConaghy, N. (1986). Sensation seeking and pathological gambling. *British Journal of Addiction, 81*, 113-117.
- Breen, R. B. (2000). *Affinity for gambling and impulsivity: Effects on participation and perseverance*. Unpublished doctoral dissertation: University of Delaware, Delaware.
- Breen, R. B., & Zuckerman, M. (1999). 'Chasing' in gambling behavior: Personality and cognitive determinants. *Personality and Individual Differences, 27*, 1097-1999.
- Breen, R. B., & Zimmerman, M. (2002). Rapid onset of pathological gambling in machine gamblers. *Journal of Gambling Studies, 18(1)*, 31-43.
- Brienbaum, M. (1986). On the construct validity of the sensation seeking scale in a non-English speaking culture. *Personality and Individual Differences, 7*, 431-434.
- Burce, A. C., & Johnson, J. E. V. (1996). Decision-making under risk: effect of complexity on performance. *Psychological Reports, 79*, 67-76.
- Burce, A. C., & Johnson, J. E. V. (1996). Gender-based differences in leisure behaviour: Performance, risk-taking and confidence in off-course betting. *Leisure Studies, 15*, 65-78.
- Caffray, C. M., & Schneider, S. L. (2000). Why do they do it? Affective motivators in adolescents' decisions to participate in risk behaviours. *Cognition and Emotion, 14(4)*, 543-576.
- Caron, A., & Ladouceur, R. (2003). Erroneous verbalizations and risk taking at video lotteries. *British Journal of Psychology, 94*, 189-194.
- Chantal, Y., Vallerand, R. J., & Vallieres, E. F. (1995). Motivation and gambling involvement. *Journal of Social Psychology, 135(6)*, 755-763.
- Christopherson, K. M., & Weatherly, J. N. (2006). The effect of visual complexity when playing a lot-machine stimulation: The role of computer experience, computer anxiety, and optimism. *Computers in Human Behavior, 22*, 1072-1079.
- Claussen, C. L., & Miller, L. K. (2001). The gambling industry and sports gambling: A stake in the game? *Journal of Sport Management, 15*, 350-363.

- Coups, E., Haddock, G., & Webley, P. (1998). Correlates and predictors of lottery play in the United Kingdom. *Journal of Gambling Studies, 14*(3), 285-303.
- Coventry, K. R., & Brown, I. F. (1993). Sensation seeking, gambling, and gambling addictions. *Addiction, 88*, 541-554.
- Coventry, K. R., & Constable, B. (1999). Gender differences, physiological arousal and the role of winning in fruit machine gamblers. *Addiction, 96*, 871-879.
- Coventry, K. R., & Norman, A. C. (1997). Arousal, sensation seeking and frequency of gambling in off-course horse racing bettors. *British Journal of Psychology, 88*(4), 671-681.
- Coventry, K. R., & Norman, A. C. (1998). Arousal, erroneous verbalizations and the illusion of control during a computer-generated gambling task. *British Journal of Psychology, 89*, 629-645.
- Coventry, K. R., & Hudson, J. (2001). Gender differences, physiological arousal and the role of winning in fruit machine gamblers. *Addiction, 96*(6), 871-879.
- Cox, B. J., Enns, M. W., & Michaud, V. (2004). Comparisons between the south oaks gambling screen and a DSM-IV-based interview in a community survey of problem gambling. *Canadian Journal of Psychiatry, 49*(4), 258-263.
- Cummings, T. W., & Corney, W. (1987). A conceptual model of gambling behavior: Fishbein's theory of reasoned action. *Journal of Gambling Behavior, 3*(3), 190-201.
- D'Angelo, R. (1987). Sports gambling and media. *Arena Review, 11*(1), 1-4.
- Davies, R. O., & Abram, R. G. (2001). *Betting the line: Sports wagering in American life*. Columbus, OH: The Ohio State University Press
- Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum.
- Deditus-Island, H. K., & Caruso, J. C. (2002). An examination of the reliability of scores from Zuckerman's sensation seeking scales, from V. *Educational and Psychological Measurement, 62*(4), 278-734.
- Delfabbro, P. H., & Winefield, A. H. (2000). Predictors of irrational thinking in regular slot machine gamblers. *Journal of Psychology, 134*(2), 117-128.
- Dickerson, M. (1977). The role of betting shop environment in the training of compulsive gamblers. *Behavioural Psychotherapy, 5*, 3-8.

- Dickerson, M. (1993). Internal and external determinants of persistent gambling: Problems in generalizing from one form of gambling to another. *Journal of Gambling Studies*, 9(3), 225-245.
- Dickerson, M., & Adcock, S. (1987). Mood, arousal and cognitions, in persistent gambling: Preliminary investigation of a theoretical model. *Journal of Gambling Behavior*, 3(1), 3- 15..
- Dickerson, M., & Baron, E. (2000). Contemporary issues and future directions, for research into pathological gambling. *Addiction*, 95(7), 1145-1159.
- Dickerson, M., Hinchy, J., & Fabre, J. (1987). Chasing, arousal and sensation seeking in off-course gamblers. *British Journal of Addiction*, 82(6), 665-672.
- Dickerson, M., Walker, M., England, S. L., & Hinchy, J. (1990). Demographic, personality, cognitive and behavioral correlates of off-course betting involvement. *Journal of Gambling Studies* 6(2), 165-182.
- Dickerson, M., Hinchy, J., England, L., Fabre, J., & Cunningham, R. (1992). On the determinants of persistent gambling behavior. I. High-frequency poker players. *British Journal of Psychology*, 83(2), 237-248.
- Dixon, M. R. (2000). Manipulating the illusion of control: variations in gambling as a function of perceived control over chance outcomes. *Psychological Record*, 50, 705-719.
- Dowling, N., Smith, D., & Thomas, T. (2005). Electronic gaming machines: Are they the crack-cocaine of gambling? *Addiction*, 100, 33-45.
- Dunstan, R. (1997). *Gambling history in California*. Retrieved October 22, 2007, from <http://www.library.ca.gov/crb/97/03/crb97003.html>
- Duvarci, I., & Varan, A. (2000). Descriptive features of Turkish pathological gamblers. *Scandinavian Journal of Psychology*, 41, 253-260.
- Engwall, D., Hunter, R., & Steinberg, M. (2004). Gambling and other risk behaviors on university campuses. *Journal of American college Health*, 52(6), 245-255.
- Frey, J. H. (1992). Gambling on sport: Policy issues. *Journal of Gambling Studies*, 8, (4), 351-360.
- Garlington, W. K., & Shimota, H. E. (1964). The change seeker index: A measure of the need for variable stimulus input. *Psychological Reports*, 14, 919-924.

- Gost, B. (2000). A dangerous bet on campus. *Chronicle of Higher Education*, 46(31), 49-52.
- Griffiths, M. (1993). Tolerance in gambling: An objective measure using the psychophysiological analysis of male fruit machine gamblers. *Addictive Behavior*, 18, 365-372.
- Griffiths, M. (1993). Fruit machine gambling: The importance of structural characteristics. *Journal of Gambling Studies*, 9(2), 101-120.
- Griffiths, M. (1995). The role of subjective moods states in the maintenance of fruit machine gambling behavior. *Journal of Gambling Studies*, 11(2), 123-135.
- Griffiths, M. (1999). Gambling Technologies: Prospects for problem gambling. *Journal of Gambling Studies*, 15(3), 265-283.
- Grriffiths, M. (2003). Internet gambling: Issues, concerns, and recommendations. *Cyber psychology & Behavior*, 6(6), 557-568.
- Gupta, R., & Derevensky, J. L. (1996). The relationship between gambling and video-game playing behavior in children and adolescents. *Journal of Gambling Studies*, 12 (4), 375-394.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., Tatham, R. C. (2006). *Multivariate Data Analysis*. Updder Saddle River, NJ: Pearson Prentice Hall.
- Haynes, C. A., Miles, J., & Clements, K. N. (2000). A confirmatory factor analysis of two models of sensation seeking. *Personality and Individual Differences*, 29(5), 823-839.
- Hebb, D. O. (1949). *The organization of behavior*. New York: Wiley.
- Hills, A. M., Hill, S., Mamone, N., & Dickerson, M. (2001). Induced mood and persistence at gaming. *Addiction*, 96, 1629-1638.
- Hills, A. M., & Dickerson, M. (2002). Emotion, implicit decision making and persistence at gaming. *Addiction*, 97(5), 598-599.
- Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing*, 46(3), 92-101.
- Holbrook, M. B., & Batra, R. (1987). Assessing the role of emotions as mediators of consumer responses to advertising. *Journal of Consumer Research*, 14, 404-419.

- Holbrook, M. B., & Hirschman, E. C. (1982). The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of Consumer Research*, 9, 132-140.
- Holbrook, M. B., Chestnut, R. W., Oliva, T. A., & Greenleaf, E. A. (1984). Play as a consumption experience: The roles of emotions, performance, and personality in the enjoyment of games. *Journal of Consumer Research*, 11, 728-739.
- Hong, Y., & Chui, C. (2001). Sex, locus of control, and illusion of control in Hong Kong as correlates of gambling involvement. *Journal of Social Psychology*, 128(5), 667-673.
- Hoyle, R. H., Stephenson, M. T., Palmgreen, P., Lorch, E. P., & Donohew, L. R. (2002). Reliability and validity of a brief measure of sensation seeking. *Personality and Individual Differences*, 32, 401-414.
- Isent, A. M., & Patrick, R. (1983). The effect of positive feelings on risk taking: When the chips are down. *Organizational Behavior and Human Performance*, 31, 194-202.
- Jack, S. J., & Ronan, K. R. (1998). Sensation seeking among high- and low-risk sports participants. *Personality and Individual Differences*, 25, 1063-1083.
- Jolley, B., Mizerski, R., & Oлару, D. (2006). How habit and satisfaction affects player retention for online gambling. *Journal of Business Research*, 59(6), 770-777.
- Kassinove, J. I. (1998). Development of the gambling attitude scales: Preliminary findings. *Journal of Clinical Psychology*, 54(6), 763-771.
- Kassinove, J. I., & Schare, M. L. (2001). Effect of the near miss and the big win on persistence at slot machine gambling. *Psychology of Addictive Behaviors*, 15(2), 155-158.
- Kroeber, H. (1992). Roulette gamblers and gamblers at electronic game machine: What are the differences. *Journal of Gambling Studies*, 8(1), 79-92.
- Kusyszyn, I. (1984). The psychology of gambling. *Annals of the American Academy of Political and Social Sciences*, 474, 133-145
- LaBrie, R. A., Shaffer, H. J., LaPlante, D. A., & Wechsler, H. (2003). Correlates of college student gambling in the United States. *Journal of American College Health*, 52(2), 53-62.
- Ladouceur, R. (2004). Gambling: The hidden addiction. *Canadian Journal of Psychiatry*, 49(8), 501-503.

- Ladouceur, R., & Sevigny, S. (2002). Symbols presentation modality as a determinant of gambling behavior. *Journal of Psychology, 136*(4), 443-448.
- Ladouceur, R., Sevigny, S., Blaszczynski, A., O'Connor, K., & Lavoie, M. E. (2003). Video lottery: Winning expectancies and arousal. *Addiction, 98*, 733-738.
- Ladouceur, R., Gaboury, A., Domont, M., Rochette, P. (1988). Gambling: Relationship between the frequency of wins and irrational thinking. *Journal of Psychology, 122*(4), 409-415.
- Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology, 31*. 311-328.
- Leary, K., & Dickerson, M. (1985). Levels of arousal in high- and low-frequency gamblers. *Behaviour Research and Therapy, 23*(6), 635-640.
- Lee, D. (2005). *Betting on March's madness*. The New York Times, D1.
- Lejuez, C. W., Read, J. P., Kahler, C. W., Richards, J. B., Ramsey, S. E., Stuart, G. L., Strong, D. R., & Brown, R. A. (2002). Evaluation of a behavioral measure of risk taking: The balloon analogue risk task (BART). *Journal of Experimental Psychology: Applied, 8* (2), 75-84.
- Lesieur, H. R., & Blume, S. B. (1987). The south oaks gambling screen (SOGS): A new instrument for the identification of pathological gamblers. *American Journal of Psychiatry, 144*, 1184-1188.
- Lesieur, H. R., & blume, S. B. (1993). Revising the south oaks gambling screen in different settings. *Journal of Gambling Studies, 9*, 213-219.
- Lightsey, O. R., & Hulsey, C. D. (2002). Impulsivity, coping, stress, and problem gambling among university students. *Journal of Counseling Psychology, 49*(2), 202-211.
- Loba, P., Stewart, S. H., Klein, R. M., & Blackburn, J. R. (2002). Manipulations of the features of standard video lottery terminal (VLT) games: Effects in pathological and non-pathological gamblers. *Journal of Gambling Studies, 17*(4), 297-320.
- Loroz, P. S. (2004). Casino gambling and aging consumers: Overcoming barriers and reaping the benefits of experiential leisure consumption. *Journal of Hospitality & Leisure Marketing, 11*, 115-138.
- MacLin, O. H., Dixon, M. R., & Hayes, L. J. (1999). A computerized slot machine simulation to investigate the variables involved in gambling behavior. *Behavior Research Methods, Instruments, & Computers, 31*, 731-734.

- Mark, M. E., & Lesieur, H. R. (1992). A feminist critique of problem gambling research. *British Journal of Addiction, 87*, 549-565.
- McDaniel, S. R., & Zuckerman, M. (2003). The relationship of impulsive sensation seeking and gender to interest and participation in gambling activities. *Personality and Individual Differences, 35*, 1385-1400.
- McDaniel, S. R., Lee, S. C., & Lim, C. (2001). Re-examining the relationship between fantasy and optimum stimulation levels. *Imagination, cognition, and Personality, 20(4)*, 355-372.
- McConaghy, N. (1980). Behaviour completion mechanisms rather than primary drives maintain behavioural patterns. *Actas Nervosa Superior, 22*, 138-151.
- McMillen, J. (1996). *Gambling Cultures: Studies in history and interpretation*. New York: Routledge.
- Mehrabian, A. (1995). Framework for a comprehensive description and measurement of emotional states. *Genetic, Social and General Psychology Monographs, 121*, 339-361.
- Mehrabian, A. (1998). Correlations of the PAD emotion scales with self-reported satisfaction in marriage and work. *Genetic, Social and General Psychology Monographs, 124*, 311-334.
- Mehrabian, A., & Russell, J. A. (1973). A measure of arousal seeking tendency. *Environmental and Behavior, 5*, 315-333.
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*, Cambridge, MA: M.I.T. Press.
- Meyer, G., Hauffa, B. P., Schedlowski, M., Pawlak, C., Stadler, M. A., & Exton, M. S. (2000). Casino gambling increases heart rate and salivary cortisol in regular gamblers. *Biological Psychiatry, 48(9)*, 948-953.
- Morris, J. D. (1995) Observations: SAM: The self-assessment manikin. *Journal of Advertising Research, 35(6)*, 63-68.
- National Gambling Impact Study Commission. (1999). *Final report*. Washington, DC.
- Oleszkiewicz, Z. Z. (1985). Demand for stimulation and vocational preference. *Polish Psychological Bulletin, 13*, 185-195.

- O'Shaughnessy, J. (1992). *Explaining buyer behavior: Central concept and philosophy of science issues*. New York: Oxford University Press.
- Oster, S. L., & Knapp, T. J. (1998). Sports betting by college students: Who bets and how often? *College Student Journal*, 32(2), 289-293.
- Pearson, P. H. (1970). Relationship between global and specified measures of novelty seeking. *Journal of Consulting and Clinical Psychology*, 43(2), 199-204.
- Petry, N. M. (2001). Substance abuse, pathological gambling, and impulsiveness. *Drug and Alcohol Dependence*, 63(1), 29-38.
- Petry, N. M. (2003). A comparison of treatment-seeking pathological gamblers based on preferred gambling activity. *Addiction*, 98, 645-655.
- Petry, N. M. (2005). *Pathological gambling: Etiology, comorbidity, and treatment*. Sterling, VA: World Composition Services, Inc.
- Potenza, M. N., Steinberg, M. A., & McLaughlin, S. D. (2001). Gender-related differences in the characteristics of problem gamblers using a gambling helpline. *American Journal of Psychiatry*, 158(9), 1500-1505.
- Powell, G. J., Hardoon, K., Derevensky, J. L., & Gupta, R. (1999). Gambling and risk taking behavior of university students. *Substance Use and Misuse*, 34(8), 1167-1184.
- Raju, P. S. (1980). Optimum stimulation level: Its relationship to personality, demographics, and exploratory behavior. *Journal of Consumer Research*, 7, 272-282.
- Richins, M. L. (1997). Measuring emotions in the consumption experience. *Journal of Consumer Research*, 24, 127-145.
- Ricketts, T., & Macaskill, A. (2003). Gambling as emotion management: Developing a grounded theory of problem gambling. *Addiction Research & Theory*, 11(6), 383-400.
- Roberti, J. W. (2004). A review of behavioral and biological correlates of sensation seeking. *Journal of Research in Personality*, 38, 256-279.
- Rolison, M. R., & Scherman, A. (2003). College student risk-taking from three perspectives. *Adolescence*, 38(152), 689-704.
- Russo, M. F., Stokes, G. S., Lahey, B. B., & Christ, M. A. (1993). A sensation seeking scale for children: Further refinement and psychometric development. *Journal of Psychopathology and Behavioral Assessment*, 15(2), 69-86.

- Scariano, S. M., & Davenport, J. M. (1987). The effects of violations of independence assumptions in the one-way ANOVA. *American Statistician*, *41*(2), 123-128.
- Schachter, S., & Singer, J. (1962). Cognitive, social and physiological determinants of emotional state. *Psychological Review*, *69*(5), 379-399.
- Seonmi Youn, K. P., Faber, R. J., & Shah, D. V. (2000). Restricting gambling advertising and the third-person effect. *Psychology & Marketing*, *17* (7), 633-649.
- 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.
- Sharpe, L., TARRIER, N., Schotte, D., & Spence, S. H. (1995). The role of autonomic arousal in problem gambling. *Addiction*, *90*, 1529-1540.
- Sharpe, L., Walker, M., Coughlan, M., 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*(4), 503-520.
- Stark, G. M., Saunders, D. M., & Wookey, P. E. (1982). Differential effects of red and blue colored lighting on gambling behavior. *Current Psychological Research*, *2*(2), 95-99.
- Steenkamp, J. E., & Baumgartner, H. (1992). The role of optimum stimulation level in exploratory consumer behavior. *Journal of Consumer Research*, *19*, 434-447
- Steel, Z., & Blaszczynski, A. (1998). Impulsivity, personality disorders and pathological gambling severity. *Addiction*, *93*(6), 895-905.
- Stinchfield, R. (2002). Reliability, validity, and classification accuracy of the south oaks gambling screen (SOGS). *Addictive Behaviors*, *27*, 1-19.
- Steel, Z., & Blaszczynski, A. (1998). Impulsivity, personality disorders and pathological gambling severity. *Addiction*, *93*(6), 895-905.
- Strong, D. R., Breen, R. B., & Lejuez, C. W. (2004). Using item response theory to examine gambling attitudes and beliefs. *Personality and Individual Differences*, *36*, 1515-1529.
- Terasaki, M., Shiomi, K., Kishimoto, Y., & Hiraoka, K. (1987). A Japanese version of the sensation seeking scale. *Japanese Journal of Psychology*, *58*, 42-48.

- Titz, K., Dadrus, D., Miller, J. (2002). Hedonistic differences between mechanical game players and table game players: An exploratory investigation on the road to comprehensive theory for gambling. *Gambling Research and Review Journal*, 6(1), 23-32.
- Vachon, J., Vitaro, F., Wanner, B., & Tremblay, R. E. (2004). Adolescent gambling: Relationships with parent gambling and parenting practices. *Psychology of Addictive Behaviors*, 18(4), 398-401.
- Vitaro, F., Ferland, F., Jacques, C., & Ladouceur, R. (1998). Gambling, substance use, and impulsivity during adolescence. *Psychology of Addictive Behaviors*, 12(3), 185-194.
- Wahlers, R. G., & Etzel, M. J. (1990). A structural examination of two optimal stimulation level measurement models. *Advances in Consumer Research*, 17, 415-425.
- Walker, M. B. (1992). *The psychology of gambling*. Tarrytown, NY: Pergamon Press, Inc.
- Walters, G. D., & Contri, D. (1998). Outcome expectancies for gambling: Empirical modeling of a memory network in federal prison inmates. *Journal of Gambling Studies*, 14 (2), 173-191.
- Wakefield, K. L., & Barnes, J. H. (1996). Retailing hedonic consumption: A model of sales promotion of a leisure service. *Journal of Retailing*, 72(4), 409-427.
- Wang, E., We, Y., Peng, Z, Lu, S., Yu, L., Wange, G., Fu, X., & Wang, Y. (2000). Test of sensation seeking in a Chinese sample, *Personality and Individual Differences*, 28, 169-179.
- Weatherly, J. N., & Brandt, A. E. (2004). Participants' sensitivity to percentage payback and credit value when playing a slot-machine simulation. *Behavior and Social Issues*, 13, 33-50.
- Welte, J. W., Barnes, G. M., Wieczorek, W. F., Tidewell, M., & Parker, J. (2002). Gambling participation in the U.S.-Results from a national survey. *Journal of Gambling Studies*, 18(4), 313-337.
- Whiteside, S. P., & Lynam, D. R. (2001). The five factor model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences*, 30, 669-689.
- Wolfgang, A. K. (1988). Gambling as a function of gender and sensation seeking. *Journal of Gambling Behavior*, 4(2), 71-77.

Wood, E., Nosko, A., Desmarais, S., Ross, C., & Irvine, C. (2006). Online and traditional paper-and-pencil survey administration: Examining experimenter presence, sensitive material and long surveys. *Canadian Journal of Human Sexuality, 15*, 147-155

Wood, R. T. A., Griffiths, M. D., Chappell, D., & Davis, M. N. O. (2004). The structural characteristics of video games: A psycho-structural analysis. *Cyber Psychology & Behavior, 7(1)*, 1-10.

Zajonc, R. B., & Markus, H. (1982). Affective and cognitive factors in preferences. *Journal of Consumer Research, 9*, 123-131.

Zuckerman, M. (1971). Dimensions of sensation seeking. *Journal of Consulting and Clinical Psychology, 36*, 45-52.

Zuckerman, M. (1979). *Sensation-Seeking: Beyond the Optimal Levels of Arousal*. Hillsdale, NJ: Erlbaum.

Zuckerman, M. (1988). Behavior and biology: *Research on sensation seeking and reactions to the media*. In Donohew, L., Sypher, H., & Higgins, E. T. (Eds.), *Communication, social cognition and affect* (pp.173-194). Hillsdale, NJ: Erlbaum.

Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge, England: Cambridge University Press.

Zuckerman, M., & Link, K. E. (1968). Expectancy and birth order as determinants of affective responses to isolation. *Perceptual and Motor Skills, 27(1)*, 279-286.

Zuckerman, M., Kolin, E. A., Price, L., & Zoob, I. (1964). Development of a sensation-seeking scale. *Journal of Consulting Psychology, 28(6)*, 477-482.

Zuckerman, M., & Kuhlman, D. M. (2000) Personality and risk taking: Common biosocial factors. *Journal of Personality, 68*, 999-1029.

Zuckerman, M., Kuhlman, D. M., & Camac, M. (1988). What lies beyond E and N? Factor Analyses of scales believed to measure basic dimensions of personality. *Journal of Personality and Social Psychology, 54(1)*, 96-107.

Zuckerman, M., Kuhlman, D. M., Joireman, J., Teta, P., & Kraft, M. (1993). A comparison of three structural models of personality: The big three, the big five, and the alternative five. *Journal of Personality and Social Psychology, 65(4)*, 757-768.

Zuckerman, M., Kuhlman, D. M., Thornquist, M., & Kiers, H. (1991). Five (or three) robust questionnaire scale factors of personality without culture. *Personality and Individual Differences, 12*, 929-941.