Using the Multiple Choice Procedure to Measure College Student Gambling

by

Leon Harvey Butler

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Approved by

Christopher J. Correia, Chair, Associate Professor, Psychology
Roger K. Blashfield, Professor, Psychology
Adrian L. Thomas, Associate Professor, Psychology
Richard E. Mattson, Assistant Professor, Psychology

Abstract

Research suggests that gambling is similar to addictive behaviors such as substance use. In the current study, gambling was investigated from a behavioral economics perspective. The Multiple Choice Procedure (MCP) with gambling as the target behavior was used to assess for relative reinforcing value, the effect of alternative reinforcers, and delay discounting for gambling among 323 undergraduate college students at Auburn University. Results suggest that individuals respond in a similar manner on the MCP with gambling as they might with a psychoactive substance. Crossover points on the MCP varied according to delay of alternative reinforcer and amount of the alternative. Responses on the MCP were sensitive to reported frequency of gambling, as well as gambling severity as reported on the South Oaks Gambling Screen (SOGS), with greater gambling behavior indicative of higher crossover points. Conceptual and treatment implications of applying the behavioral economic perspective to gambling are discussed.

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INTRODUCTION

Gambling is considered an ancient, universal behavior and has been well

documented in virtually every culture (Chamberlain, 2004). In fact, artifacts and

historical records indicate that several of the world's earliest civilizations, such as the

Chinese and Babylonians, engaged in gambling behaviors earlier than 3000 B.C.

(Chamberlain, 2004). Therefore, gambling is a human behavior that has transcended

temporal, geographical, and cultural boundaries.

Gambling is defined as engaging in a game of chance for money or some other

reward (O'Brien, 1998). For gamblers, the goal of gambling may be to win more (e.g.,

money) than they lose. However, popular forms of gambling are based on the probability

that the gambler will lose more, over time, than they will win. Most gamblers

acknowledge that the odds favor the house, yet believe that it is within their ability to

beat the odds and ultimately beat the house (the gambler's fallacy) (O'Brien, 1998).

Though people may feel that the chance to earn money is the key reward

mechanism for gambling behavior, this may not always be the case. In a recent study

Neighbors, Lostutter, Cronce, and Larimer (2002) identified 16 different motives that

may be important for college student gamblers (discussed later). Other research has

indicated at least five main motives exist for gambling behavior, including socialization,

amusement, excitement, monetary gain, and avoidance of (or escape from) negative

affect (Jacobs, 1987; Klingemann, 1995; Lee, Chae, Lee, & Kim, 2007). These motives

often lead people to continue gambling even when problems related to gambling are apparent. Such individuals can be classified as problem or pathological gamblers.

Problem Gambling

Not every individual who engages in gambling activity develops gambling related problems. However, repeated gambling behaviors may result in negative consequences for some individuals. The National Council on Problem Gambling defines problem gambling as "gambling behavior that causes disruptions in any major area of a person's life" (NCPG, 2000). In much of the literature, the terms compulsive gambling, pathological gambling, and problem gambling are used interchangeably to describe unhealthy patterns of gambling behavior. However, it is important to note that individuals with problematic gambling habits may not meet diagnostic criterion for pathological gambling, which is the term used in the DSM-IV-TR. (You don't need this sentence because your next paragraph illustrates your point sufficiently)

In the United States, studies estimate that 60% to 80% of the adult and adolescent population has, at some point, engaged in some form of gambling (Chamberlain, 2004). Of those, 5% to 7% may experience negative consequences but not necessarily be classified as pathological gamblers. According to the Diagnostic and Statistical Manual of Mental Disorders – IV-Text Revision (DSM-IV-TR, APA, 2000), studies estimate the lifetime prevalence of pathological gambling to range from 0.4% to 3.4% in adults; however, prevalence rates in adolescents and college students may range from 2.8% to 8%.

According to the DSM – IV-TR (APA, 2000), in order for gambling to reach the level of diagnosis, the behavior must result from the failure to resist an impulse, drive, or

temptation to perform an act that is harmful to the person or to others. This harm may be in the form of financial, social, employment/school, or legal problems. Additionally, pathological gambling may be used as a coping method to avoid depressed mood or other life stressors. Therefore, those individuals classified as pathological gamblers may experience severe negative consequences. Because pathological gambling appears to be more prevalent among college students (APA, 2000), it seems important to study this population.

College Student Gambling

Research suggests that college students have among the highest rates of problem and pathological gambling (Lesieur et al., 1991; Shaffer, Hall, & Vander Bilt, 1999). In fact, some studies have found that college students have a higher prevalence of problem gambling (5.05%) than adults (1.71%) and adolescents (4.25%) (Shaffer et al., 1999). Despite these findings, limited research has been done to address gambling among college students. A recent meta-analysis on college student gambling only found 15 articles published up to 2005 (inclusive) in the United States or Canada that fit methodologically sound criterion.   Studies had to have been published in a peer reviewed journal to be included. The study also had to use the South Oaks Gambling Scales (SOGS; Lesieur & Blume, 1987), which is a widely used assessment tool. Finally, the study had to use a cutoff score of 5 or greater on the SOGS for problematic gambling (as indicated by research on the SOGS), and report the percentage of the sample classified as problematic (Blinn-Pike, Worthy, & Jonkman, 2007).

College students tend to participate in more risky and impulsive behaviors, so it does not seem odd that they would participate in gambling at higher rates. Several

studies have indicated that as many as 90% of college students have gambled and that at least 20% of college students report gambling at least once a week (LaBrie, Shaffer, LaPlante, & Weschler, 2003; Ladouceur, Dube, & Bujold, 1994; Oster & Knapp, 2001). Additionally, researchers have found that between 3% and 8% of their college student samples meet criterion for having a gambling problem (Blinn-Pike et al, 2007; Ladouceur et al., 1994; Lesieur et al., 1991; Neighbors, Lostutter, Larimer et al, 2002; Winters, Bengston, Dorr, & Stinchfield, 1998). College student problem gamblers also report more academic difficulty, heavier alcohol consumption, more nicotine and illicit drug use, and more unprotected sex than their non-problem gambling counterparts (Engwall, Hunter, & Steinberg, 2004; Labrie et al., 2003; Winters et al., 1998).

Measurement of problematic gambling among college students. The range of reported prevalence rates of problem gambling among college students (3%-8%) is an indication of the controversy that exists concerning this topic. Some studies have found that the difference in reported rate is dependant upon the measure that is used (Engwall et al., 2004; LaBrie et al., 2003; Slutske, Jackson, & Sher, 2003). Therefore, when conducting research on gambling among college students it is important to consider the purpose of measurement of problem gambling (i.e. screening or diagnosis) and to consider the various strengths and limitations of relevant measures.

The most commonly used assessment tool for problematic gambling is the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987; Shaffer et al, 1999). It therefore seems reasonable to consider this as a viable option for the measurement of problem gambling. Additionally, there is some evidence suggesting that the SOGS can be used for assessing problematic gambling among college students. The original psychometric

study conducted on the SOGS included a sample of 384 college students (Lesieur & Blume, 1987). In this original study, among college students, the SOGS demonstrated adequate predictive validity based on DSM-III-R criterion for pathological gambling. Specifically, Lesieur and Blume reported good specificity (.99), adequate positive predictive validity (.75), and good negative predictive validity (.96) for the SOGS. The researchers did not present any other psychometric information regarding the performance of the SOGS when used with college students.

The SOGS has been criticized because it is based on the DSM-III-R criterion for pathological gambling. The concern is largely due to significant changes in the criterion for pathological gambling from the DSM-III-R to the DSM-IV. More specifically, the ideas of tolerance and withdrawal have been added to the criterion. With this limitation in mind, researchers have more recently compared the SOGS with DSM-IV criterion. These studies, though preliminary, suggest that the SOGS is highly correlated with DSM-IV criterion for pathological gambling when used with community or adult samples (Beaudoin & Cox, 1999; Cox, Enns, & Michaud, 2004; Stinchfield, 2003).

Additionally, a variety of cutoff scores have been used to classify participants as problematic gamblers based on their SOGS scores. A SOGS score of 5 is most typically used as an indicator of problematic gambling; this cutoff score has been criticized as being too conservative by some (Cox et al, 2004) and as producing too many false positives by others (Ladouceur, Ferland, Poulin, Vitaro, & Wiebe, 2005). Largely for this reason, the cutoff score of 5 is labeled as "probable pathological gambling," which is consistent with using the SOGS as a screening tool to identify cases in need of additional assessment. No research has been done to determine the best cutoff score for college

students, and researchers using the SOGS among college students have reported using cutoffs scores as high as 9.5 and 13 (Petry, 2001; Petry & Casarella, 1999). More research is needed to address this issue, as the current state of the literature does not provide a definitive indicator of problematic gambling among college students. For now, researchers should be aware when using the SOGS to measure problematic gambling among college students that the cutoff score of 5 may not be an accurate indicator of clinically significant gambling problems. The SOGS may still be a good measure of an individual's level of gambling behavior and related problems.

Another measure of problem gambling is the Massachusetts Gambling Screen – DSM-IV subscales (MAGS; Shaffer, Labrie, Scanlan, & Cummings, 1994). The MAGS was originally developed as a gambling screen based on the DSM-IV criterion for pathological gambling for use with adolescents. One study found that the MAGS is significantly correlated with self-reported gambling behaviors among college students (Weinstock, Whelan, & Meyers, 2004) but no additional psychometric information in regards to a college population are currently available for the MAGS.

In 2007, Whelan, Meyers, and McCausland undertook a study to compare the viability of using the SOGS and the MAGS as problematic gambling screens among college students. Because no "gold standard" exists for measurement of problematic gambling, the researchers used the Diagnostic Interview for Gambling Severity (DIGS; Winters, Specker, & Stinchfield, 1996), a DSM-IV based clinical diagnostic interview for problem gambling, as the standard for the two measures. The researchers recruited 159 undergraduates who reported recent gambling to participate in the study. The participants completed the SOGS, MAGS, a gambling-timeline follow back (G-TLFB)

(6-months), the Gambling self-efficacy questionnaire (GSEQ), and the DIGS.

Correlation matrices were used to compare the SOGS and MAGS to the other measures

of gambling severity. Researchers found that both the MAGS and the SOGS were highly

correlated with the DIGS, the G-TLFB, and the GSEQ. Additionally, both showed good

divergent validity as related to demographic information, with no significant correlation

for years in school or monthly income. However, the SOGS was significantly correlated

with age. Using the DIGS as criterion, the SOGS demonstrated good sensitivity and

specificity by correctly identifying 71% of true problem gamblers and 88% of non-

problem gamblers. The MAGS demonstrated very good specificity by correctly

identifying 99% of non-problem gamblers but only correctly identified 34% of true

problem gamblers. Therefore, in screening for problematic gambling among college

students, this study suggests that the SOGS may be more appropriate as it better identifies

those who may have gambling problems.

While other measures of problem gambling exist, such as the Canadian Problem

Gambling Index and the Problem Gambling Severity Index, some of these measures are

not administered via paper pencil format. Additionally, little research is available on the

reliability and validity of other problem gambling screens. The SOGS has demonstrated

adequate psychometric properties (Ladouceur et al., 1994; Lesieur & Blume, 1987;

Lesieur et al., 1991). Additional research is needed to further establish the reliability,

validity, and clinical utility of the current problem gambling screens, specifically within

various populations such as college students. Further research may also lead to the

development of more useful tools in this area. However, the scope of this study does not

allow for such exploration and will make use of the SOGS as the most well-established measure for problematic gambling to date.

College student gambling motivation. Several theories are available to describe why people gamble, with motivational theories among the most common. The most intuitive motive is that of winning money (Ladouceur & Walker, 1998); however, additional motives have been identified as well. McCormick (1987) suggests that there are two types of gamblers; 1) those chronically under-stimulated (excitement seekers) and 2) those recurrently depressed (avoidance seekers). Other suggested motives include hyper-arousal, boredom, negative self-concept, entertainment, unconscious masochistic desire to lose, and a means of addressing parental conflict (Bergler, 1958; Jacobs, 1986; Klingemann, 1995; Rosenthal & Rugle, 1994). It is uncertain whether problematic and non-problematic gamblers share similar motives for gambling, only differing in magnitude, or if they typically differ as to type of motive.

Much of the research on gambling motives tends to give lists of possible motives as opposed to giving an open format for participants to define their own motives. Neighbors, Lostutter, Cronce et al. (2002) investigated motives related to college student gambling behaviors without imposing a set of predefined motives. They recruited 184 undergraduate college student gamblers to participate. Of the 184 participants, 79 were non-problem gamblers, 72 had minimal gambling problems, 16 were subclinical problem gamblers, and 6 were probable problem gamblers, according to the SOGS scores. Participants completed a survey that asked for a list of the top five motives they experienced for gambling in rank order.

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Researchers were able to determine 16 distinct motives from the survey. The 16 motives in order of prevalence included money, enjoyment, social, excitement, occupy time/boredom, winning, conformity, competition, risk, interest, skill, coping, chasing losses, luck, drinking, and challenge. Over 70% of the sample endorsed money, enjoyment, and social motives as their primary gambling motive. These findings are important to help conceptualize college student gambling. Determining motivational aspects of gambling behavior among college students is an important step to understanding this phenomenon.

It seems that attempting to determine the valence of the reward involved with gambling behaviors is also an important area for research. Indeed, the reward valence or relative reinforcing value of gambling may underlie the number or types of motives that gamblers report. Research on the relative reinforcing value of alcohol tends to be informed by the behavioral economic perspective. This theory may be useful for gambling behavior as well.

Behavioral Economics

Extensive research indicates that behavioral economic principles can be applied to drug use (Bickel, DeGrandpre, & Higgins, 1993; Bickel, DeGrandpre, Hughes, & Higgins, 1990; Bickel, Madden, & Petry, 1998; Greewald & Hursh, 2006; Hursh, 1993). Behavioral economic theory makes use of various aspects of consumer demand theory to make predictions about the reinforcing value of target behaviors. Within addictive theory, the target behavior is typically drug use but may also be another addictive behavior. While some research exists suggesting various motivations for gambling behavior, little has been done to address behavioral economic principles that may be key

in gambling behavior. An overview of some key behavioral economic principles will help in understanding how this theory may also be used as a model for gambling behavior.

Reinforcer value and cost. In 1960, Becker introduced the idea that choices may carry with them differing values, and these subjective values may influence decision-making. Within substance abuse literature this subjective value is termed relative reinforcing value (Bickel et al, 2000). The relative reinforcing value of a given behavior can be determined using Herrnstein's (1970) matching law. According to the matching law, the relative reinforcing value of a behavior is equal to the cross product of the behavior (the amount of enjoyment derived from the behavior multiplied by the frequency of the behavior) divided by the cross product of all possible behaviors (enjoyment of all behaviors multiplied by frequency of all behavior). Some researchers have used this formulation to determine the relative reinforcing value of alcohol by gathering frequency and subjective pleasure of behaviors (Murphy et al, 2005). The Multiple Choice Procedure (MCP) is one tool used to determine relative reinforcing value by presenting choices between a given behavior and escalating monetary amounts. The MCP will be discussed later.

Reinforcer value is important to choice behavior, but it is not the sole variable. It is also important to consider the cost of the reinforcer. In economic theory, cost is often determined by monetary means. However, in behavioral economics other important factors exist. For a behavior such as alcohol use, cost may include money, effort to obtain alcohol, time to consume and recover from alcohol use, potential health risks, and potential legal issues (Murphy, Correia, & Barnett, 2007). Therefore, the cost of any

behavior is not necessarily determined monetarily. According to economic theory and the law of demand (DeGrandpre & Bickel, 1996), as the cost of a behavior increases the frequency of the behavior should decrease. This principle has been repeatedly applied to substance use behavior in animals and humans (e.g. Bigelow & Liebson, 1972; Meisch & Thompson, 1973). However, because many of the ideas involved in cost (time, health, effort) are subjectively valued and subject to change, the cost of a behavior is not fixed and is subject to many influences. Some research has shown that the perceived relative cost of drinking alcohol can be increased and relative reinforcing value decreased by providing interventions such as motivational interviewing and personalized feedback, thus making people aware of negative outcomes and thereby decreasing consumption (Murphy, Correia, Colby, & Vuchinich, 2005). The interplay between cost and consumption or engagement in a behavior is one of the key components of behavioral economics. It is important to consider the costs of both the targeted behavior and the potential alternative behavior.

Availability of a reinforcer and alternative reinforcers. Allison (1983) explains the influence of other available reinforcers and their value. He indicated that when two goods have the same value (perfect substitution, given equal cost) then the goods will be exchanged at any time, or an individual will choose each good (or behavior) at equal rates over time. As the cost of one good increases, allocation of behavior will shift to functionally similar goods with a lower cost. Therefore, the availability of the target behavior and alternatives is important to choice behaviors. Despite the value of a reinforcer (i.e. a million dollars), if that reinforcer is not available it will have no

influence over behavior. Therefore, the perception of reinforcer availability is important to choice behavior.

The number of available reinforcers is also important. As a larger number of attractive reinforcers are available it is more likely that an individual will distribute their time and resources to obtain reinforcement from a variety of sources. This has been demonstrated by research in alcohol use, indicating that drinking is decreased as more alternative reinforcers are available (Correia, Benson, & Carey, 2005). Additionally, research has indicated that individuals who tend to drink more heavily also tend to find less reinforcing value in non-alcohol related activities (Correia, Carey, Simons, & Borsari, 2003). Therefore, as individuals hold greater value for alternative behaviors and have the alternatives available they are more likely to choose another behavior over the target behavior (i.e. alcohol use or gambling). This principle has been demonstrated for both drug and non-drug reinforcers in both human and non-human animals (Bickel, DeGrandpre, & Higgins, 1995; Carroll, 1996; Carroll, Bickel, & Higgins, 2001; Higgins, Heil, & Plebani-Lussier, 2003; Murphy, Barnett, & Colby, 2006).

Vuchinich and Tucker (1988) reviewed a number of studies that demonstrate the effect of availability of a target behavior and of alternatives within substance use. Within this discussion the availability of the behaviors (target and alternative) is largely determined by direct constraints placed on a behavior. These constraints may generally be termed as cost (see above for a discussion of cost). Vuchinich and Tucker found that a large amount of research, both human and animal, has demonstrated that as alternatives become available the preference for a substance is decreased. This review of the

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literature illustrates that availability and cost of alternatives are important determinants of choice behavior.

More recently, Correia and colleagues (2005) studied the effect of increases in alternative behaviors on substance use. The researchers conducted a screening survey to obtain baseline information on substance use and the frequency of exercise and creative behaviors. Of the 133 undergraduates completing the survey, 105 (current substance users) were randomly assigned to one of three groups. Thirty-three participants were assigned to a substance reduction (SR) group. This group received instruction to decrease their substance use by 50% for the next 28 days but did not receive an intervention or tips on how to do this. Thirty-one participants were placed in the activity increase (AI) group. This group received instruction to increase their exercise and creative activity by 50% during the next 28 days. Thirty-six participants were placed in a no-instruction control group. Participants returned after 28 days to assess exercise, creative activity, and substance use. The researchers found that AI group participants increased their exercise and creative activities frequency relative to baseline and relative to the SR and Control groups. They also found that both SR and AI groups reported significantly fewer substance use days and significantly fewer standard drinks consumed in the past 28 days relative to baseline. These findings support the idea that increased alternative activities may lead to decrease in a target behavior, in this case substance use.

It is likely that constraints on gambling and the availability of alternative reinforcers will have similar effects on gambling behavior as on substance use behavior. For example, those living near a casino may be more likely to gamble because of increased availability of gambling (Pasternak & Fleming, 1999; Sévigny, Ladouceur,

Jacques, & Cantinotti, 2008). Alternatively, as the availability of other reinforcing activities increases, gambling behavior may decrease.

Delay discounting. The availability of a reinforcer is not only a measure of physical proximity but also temporal proximity. As a reinforcer approaches in time, its subjective value increases. Alternatively, when a reinforcer is delayed, the subjective value is diminished. The relationship between the temporal availability of a reinforcer and its subjective value has been referred to as delay discounting (or hyperbolic discounting) (Ainslie, 2001). The theory that delay of reinforcement is a crucial part of choice was introduced in the economic field as early as 1934 (Rosenstein-Rodan, 1934). However, it was best illustrated and mathematically represented by R. H. Strotz in 1955. In his study of individual choice, when planning economic decisions, he took into account the factor of delay to return of investment. Strotz indicated that at a given time a decision might be made to follow the most profitable course of action. However, as time passes the decision is reevaluated and value of other courses may increase due to the temporal proximity of their return. Strotz therefore predicted that the more delayed a return on investment, the less subjective value it held and the less likely the individual would be to choose that course of action. He ultimately represented this behavioral pattern as an exponential function resulting in curvilinear patterns of value judgment and decision-making. Strotz's exponential function was the basis for delayed discounting for many years, until the relationship of time and value was shown to better fit hyperbolic functions.

The value of a particular reinforcer is also related to the temporal availability of alternative reinforcers. This has been demonstrated with alcohol and substance use; as

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alternative reinforcers are temporally delayed, the value of alcohol or substance use seems greater than the value of the alternative and is then chosen over that alternative (e.g. Bickel, Odum, & Madden, 1999; Chutuape, Mitchell, & de Wit, 1994; Heil, Johnson, Higgins, & Bickel 2006; Mitchell, Fields, D'Esposito, & Boettiger, 2005; Odum, Madden, Badger, & Bickel, 2000; Vuchinich & Simpson, 1998; Vuchincih & Tucker, 1983). When applied to gambling, one could postulate that an individual with pathological gambling behavior may choose gambling over financial security, perhaps in part because the delay to financial security decreases its immediate subjective value. One may label this choice behavior as impulsivity. Delay discounting and the delay discounting task may be conceptualized as measures of impulsivity. The idea that impulsivity is important to pathological gambling has been documented in research using delay discounting tasks as well as other measures of impulsivity (Alessi & Petry, 2003; Clarke, 2004; MacKillop, Anderson, Castelda, Mattson, & Donovick, 2006).

Little research is available that examines delay discounting in gamblers. Reynolds (2006) indicated that there were only five studies in this area, and two more studies have been published since the review. However, within the available literature there exist some inconsistencies.

The first study to investigate delay discounting and gambling compared a population of substance using/problem and non-problem gamblers to non-substance using/non-problem gambling controls (Petry & Casarella, 1999). Participants completed two hypothetical delay discounting tasks, one with $100 as the delayed reward the other using $1,000. Problem gambling was measured with the SOGS. An average SOGS score of 9.5 was reported for all gamblers, but SOGS scores were not reported as a

function of being in the problematic or non-problematic gambling group. Petry and Casarella found that substance using problem gamblers and substance using non-problem gamblers discounted more than controls. They also found that substance using problem gamblers discounted more than substance using non-problem gamblers for the $1,000 task. These early findings suggest that problem gambling and substance use may have an additive effect on delay discounting.

One other study has investigated the impact of problematic gambling on delay discounting with participants with SOGS scores greater than 13, compared to those with scores less than 13 (Petry, 2001). This study confirmed that delay discounting is greater in a problem gambling population and is similar to two other studies where problematic gamblers demonstrated more impulsivity through higher delay discounting scores than non-problem gamblers (Alessi & Petry, 2003; MacKillop et al, 2006).

Two studies reported findings for delay discounting comparing problem gamblers and non-gambling controls (Dixon, Marley, & Jacobs, 2003; Holt, Green, & Myerson, 2003). Dixon and colleagues found that gamblers showed significantly more discounting than did controls. However, Holt and colleagues found no differences between these groups. The discrepancy is important because it indicates the need for continued research in the area to determine the level of gambling (i.e., any gambling vs. problematic gambling) at which differences in delay discounting become apparent.

Despite limited research on delay discounting with problematic gambling, most of the research infers that problem gamblers will have greater rates of delay discounting than non-problem gambling controls and perhaps non-gamblers. The impulsive nature of problem gambling is one of its most important characteristic, thus lending itself to the

theory of delay discounting. Within gambling, one may assume that problem gamblers

discount in two directions. They may discount the negative impact of future losses in

favor of the current possibility of gain. Because the value (both positive and negative) of

past events may be discounted in a similar manner and pattern (hyperbolic) as future

events (Yi, Gatchalian, & Bickel, 2006), problem gamblers may also discount the

negative impact of past events, and be more likely to choose the immediate possible

reward of winnings. Thus, delay discounting theory may have very real application to

problematic gambling for positive and negative events, and for past and future events.

When an individual understands these three key principles to behavioral

economics (relative value and cost, availability and alternatives, and temporal

discounting) for a given behavior, they are more likely to be able to predict choice and

alter future choice behavior by manipulating these variables. Therefore, it is important to

understand how these variables work for gambling, and how they might be used to

explain why gambling becomes problematic for some people. The MCP is a tool that has

been used to investigate the application of behavioral economic principles to the use of

psychoactive substances. The subsequent section will review literature on the use of the

MCP, and discuss how it could be applied to gambling.

The Multiple Choice Procedure

The multiple choice procedure (MCP) provides a measure of relative reinforcing

value of a reinforcer, a key aspect of behavioral economics. The MCP arranges

intermittent reinforcement for a behavior by presenting a participant with differing levels

of two reinforcers. Studies often manipulate the dose of the drug made available to the

participant. The MCP can also designate that the reinforcers are received either

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immediately or at some point in the future. In this manner, the MCP provides a means to look at how magnitude or dose effects and temporal discounting impact the relative reinforcing value of a target behavior. Within studies of psychoactive substances, a discrete amount of substance is paired with an escalating amount of money. The datum point of interest with the MCP is the crossover point. This is the point at which an individual stops choosing the reinforcer of interest (a substance, or gambling behavior) and begins to choose the alternative reinforcer (money). This point is hypothesized as the relative reinforcing value of the reinforcer in question. The current study was designed to determine if the MCP is capable of assessing the relative reinforcing value of gambling and if gambling behavior is sensitive to dose and temporal manipulations of reinforcer availability.

If gambling can be conceptualized within the framework of behavioral economics, the MCP should be a good tool to measure the reinforcing value of gambling relative to alternative reinforcers. The MCP has been used in a number of studies both in vivo, where participants actually receive one of their choices, and hypothetically, where no choice is received, to help determine the value of various reinforcers. These studies have investigated a range of drugs, including alcohol (Benson, Little, Henslee, & Correia, 2009; Little & Correia, 2006), cocaine (Jones, Garrett, & Griffiths, 1999), opiates (Greewald & Hursh, 2006), and caffeine (Garrett & Griffiths, 1998). However, no research was found indicating the use of the MCP to study the reinforcing value of gambling behavior or other impulse control disorders. Similarities between the processes leading to substance abuse and problematic gambling have been proposed (Shaffer et al, 2004). Discounting of delayed rewards may be one such similarity, and previous

research has demonstrated that the MCP is sensitive to delays associated with an alternative reinforce (e.g., Benson et al., 2009).

Researchers have assessed the use of the MCP with college student drinkers. Little and Correia (2006) reported findings using the MCP with college students to assess the relative reinforcing value of alcohol use in a two part study. In part one, the researchers obtained measurement of alcohol use including number of days alcohol was consumed, number of standard drinks consumed, and alcohol-related problems experienced over the past 28 days for 320 undergraduate students. Participants also completed four versions of the MCP with alcohol and money as the two choices. For two versions, 6 ounces of alcohol were available; for the other two, 12 ounces were available. For each amount of alcohol, the alternative monetary reinforcer was available either immediately or in one week. In each version, the alternative monetary reinforcer increased from $0 to $20 across 30 distinct choices. All choices on the MCP were hypothetical. In part one, researchers found that the average MCP crossover points for all four surveys were significantly and positively related to alcohol use frequency, quantity, and associated problems. The crossover points in the delayed versions of the MCP were higher than those in the immediate versions, indicating that the subjective value of alcohol increased when the alternative reinforce was delayed. This finding supports the idea that the MCP may be used as a measure of alcohol use severity for a college student sample. It also gives hope to the further use of the survey version of the MCP in college student samples for measurement of reinforcing value of other substances or behaviors.

In part two of the study, Little and Correia (2006) included 21 current drinkers in a laboratory (or in vivo) MCP procedure. Participants completed the alcohol use and

problems inventories as earlier described. However, when completing the four versions

of the MCP, participants were placed in a lab with the alternatives located before them.

After completing the MCP, participants randomly received one of their choices. While

delay to alternative reinforcer remained a significant predictor of crossover point, the

MCP was only significantly related to drinking occasions per month and binge episodes

per month. Therefore, the laboratory version of the MCP did not significantly correlate

with self-reported alcohol problems or average number of drinks per week.

In a replication study, Benson et al. (2009) reproduced the laboratory procedure

with 27 undergraduates. The procedure was identical to part two of Little and Correia

(2006), save the amount of alcohol available in the MCP was changed to 12, 24, or 36

ounces with the alternative money available either immediately or in one week, thus

creating six versions of the MCP. The researchers did not report participants' level of

current alcohol use. They did find that the MCP was sensitive to delays associated with

the alternative monetary reward; as delay was introduced, the crossover points

significantly increased. These results, coupled with Little and Correia (2006), suggest

that the MCP is sensitive to the behavioral economic principle of delay discounting.

Though the research using the MCP with college students is limited, the findings suggest

that the MCP can be used to study the behavioral economic factors that influence the

reinforcing value of alcohol use.

Similarities among "Addictions"

A large amount of research has indicated similarities among various addictions

(substance related and behavioral). These similarities are important because if addictions

have similar characteristics they may also be understood by using similar theory and

treated using parallel treatments. For problematic gambling, if similarities exist with

substance related addictions, then the behavioral economics theory and the MCP are

viable tools for further research.

The most apparent commonalities between gambling and substance related

addictions are common clinical features. Substance dependence and pathological

gambling are characterized by: engagement in the behavior despite adverse

consequences; decreased control over the behavior; an appetitive urge to engage in the

behavior prior to acting out; and engaging in the behavior compulsively (Grant &

Potenza, 2005; Potenza, 2006). Additionally, similar to substance related addictions,

pathological gamblers may display withdrawal and tolerance (Blanco, Moreyra, Nunes,

Saiz-Ruiz, & Ibanez, 2001). The DSM-IV-TR includes tolerance and withdrawal as

possible symptoms of both pathological gambling and substance dependence.

From a purely behavioral perspective, gambling may be similar to any behavior.

Rewards and punishments are dispersed in a manner that either reinforces or discourages

the behavior. As early as 1953, Skinner observed that gambling behavior may be a result

of reinforcement history. Similar to substance use, gambling behavior can be reinforced

in a number of ways. Such reinforcers may include financial gains, physiological

arousal, psychological pressures (avoidance of depression, raising self-concept), and

psychosocial meanings (Griffiths, 1999). Thus gambling behavior, similar to substance

use, may be acquired and maintained through reinforcement and avoidance of

punishment (often withdrawal). While the outwardly apparent reinforcers may differ

between substance use and gambling, the underlying behavioral mechanisms are similar.

Another important connection between gambling and substance use is that these behaviors stimulate the production of dopamine in the brain. A number of studies have noted similar dopamine activation for gambling, sexual behavior, cocaine, and other substances (Betz, Mihalic, Pinto, & Raffa, 2000; Brieter, Aharon, Kahneman, Dale, & Shizgal, 2001; Daigle, Clrak, & Landry, 1988; Hymna, 1994; Wise, 1996). Dopamine is the brain's main neurotransmitter associated with reward and pleasure and is important to the acquisition and maintenance of addiction. Other brain pathways have also been implicated in pathological gambling, similar to substance abuse. Both the mesolimbic system and the autonomic nervous system are stimulated in similar ways for problem gamblers and for substance abusers. Studies indicate problem gamblers show increased autonomic and noradrenergic arousal in the presence of the addictive stimulus (gambling) similar to substance users (Meyer et al, 2000; Meyer et al, 2004; Shinohara et al, 1999). In regards to the mesolimbic system, medication used in treating alcoholics has similar efficacy on problem gamblers (Kim, Grant, Adson, & Shin, 2001).

Additionally, common vulnerabilities have been noted for substance abuse and gambling. The influences that may lead to addictive behaviors include intrapersonal social risk factors such as impulsivity, poor parental supervision, and delinquency in youth (Brenner & Collins, 1998; Caetano, John, & Cunrandi, 2001; Vitaro, Brendgen, Ladouceur, & Tremblay, 2001). Common genetic predisposition has also been noted as a vulnerability to both alcohol abuse and gambling (Slutske et. al, 2000).

Finally, substance abuse and problem gambling are associated with similar problems. Reports of deceit, shame, guilt, and dysthymia are common in the literature (Black & Moyer, 1998; Christenson, et. al, 1994; Vaillant, 1983). Additionally, reported

withdrawal symptoms for gambling such as anxiety and depression may be alleviated by gambling again (Wray & Dickerson, 1981), similar to a substance abuser using their drug of choice to avoid withdrawal.

Purpose of the Study

Research suggests that gambling may be a compulsive behavior and may be risky for those who become problem gamblers (Blinn-Pike et al, 2007; Weinstock, Whelan, & Meyers, 2008). Because gambling is similar to substance use in many regards, it is possible that gambling behavior can be understood through the behavioral economics model that has been applied to substance use. However, no studies to date have attempted to quantitatively measure the relative reinforcing value of gambling behavior. The use of six adapted versions of the MCP in this study allowed for measurement of the relative reinforcing value of gambling behavior within a sample of college students. Participants completed six versions of the MCP designed to assess the reinforcing value of various amounts of money for gambling, relative to monetary payments available either immediately or after a delay. We designed the study to explore the use of the MCP with gambling among college students and to address the following hypotheses.

Hypothesis one: The relative reinforcing value of gambling as indicated by the crossover point on the MCP will be correlated with participants' level of impulsivity and gambling behavior as indicated by SOGS scores and frequency of gambling behavior.

Hypothesis two: Scores on the MCP will be higher as amount of money offered for gambling increases.

Hypothesis three: Scores on the MCP will be higher as delivery of alternative monetary amounts is delayed.

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METHODS

Participants

Three hundred and thirty-nine participants from among undergraduate students enrolled in psychology and statistics courses at Auburn University completed the online survey. Of the 339 participants who completed the online survey, 323 completed the entire battery and provided usable data. We added a number of items shortly after the initiation of data collection. Of the 339 participants, 270 completed questions regarding religious preference, number of days gambled in the past 28 days, average weekly winnings and losses, and game of choice. We excluded 16 participants from the analysis due to inconsistencies within their data. In these cases, individuals reported multiple, and often irregular, crossover points on the MCP despite instructions directing to crossover only one time.

Of the 323 participants with usable data, 67.8% were female. The average age was 20.5 years (range 19 to 36). With regard to ethnic category, the sample was 83% Caucasian, 11.5% African American, and 3.4% Hispanic/Latino. Thirty seven percent of participants reported Greek affiliation. Nearly the entire sample (99%) was single. The average number of post high school years of education was 2.3. Of the 270 participants who completed the religious preference question, 23% reported being Baptist, 15.5% Methodist, 13.3% Catholic, 10% non-denominational, 7% Presbyterian, and 6.6% Christian; with 9.3% declining to answer. Religious preference did not significantly

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effect the results. This sample is similar to Auburn University demographic reports for undergraduates, which report an average age of 20 years and a high percentage of Caucasians (87.5%). However, the current sample has a higher percentage of females (67.8%) than university reports (49%).

Measures

Participants filled out a brief demographic questionnaire. The questionnaire included gender, age, ethnicity, Greek affiliation, year in school, current residence, marital status, and religious preference.

All participants completed six versions of the MCP adapted from the original form to indicate hypothetical choices between allotments of money to gamble in a person's game of choice. The money for gambling was to be immediately available, whereas the guaranteed money was to be delivered immediately or after a one week or one month delay. We developed the six versions following previously developed models of MCP surveys (Chutuape, Silverman, & Stitzer, 1998; Little & Correia, 2006). The guaranteed amount increased from $0.00 to $150 in $5 increments on all six version of the MCP. To create six versions of the MCP, two dollar amounts for gambling ($10 and $25) were paired with each of the three time frames for receiving the guaranteed money (immediate, 1 week, 1 month). Thus three versions include $10 to gamble with, and either no delay to guaranteed money (immediate), one week delay to guaranteed money, or one month delay to guaranteed money. Three parallel forms with $25 to gamble with were also used. Each version of the MCP yielded a crossover point, and an average crossover point taken from all six versions was also generated for each participant.

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The procedure was forced choice with items such as:

Would you rather have:
$10 to gamble in your game of choice   or $10.00 immediately

Participants were asked to choose one of the two options. A complete copy of all six

versions of the measure may be found in appendix C.

The following written directions were presented to each participant prior to each

of the MCP versions.

> For the following survey you will be presented with a series of hypothetical choices and asked to choose which one you would prefer. Imagine you are given a choice between money that you could use right away to gamble with in the game of your choice vs. money that could be used for anything other than gambling.
>
> The choice on the left will always be a specific amount of money that may only be used to gamble with in your game of choice. For example, if your game of choice is poker, imagine that the money would be used right away in a poker game
>
> The choice on the right will always be a guaranteed amount of money to be received at the time interval indicated. In other words, sometimes you will get the guaranteed money right away, and sometimes you will have to wait for it. Pay attention to the specific choices as they change from form to form. At the point that you begin to choose the guaranteed money you will continue to choose that one for the rest of the time.

The directions instructed participants to choose between the two choices and to mark

which they would prefer. The directions also instructed participants that once they began

to choose the guaranteed money over the gambling money that they should then continue

to choose the guaranteed money for the rest of the items.

The point where a participant began to choose the guaranteed money over the

money to gamble is denoted as the crossover point and is purported to be the relative

reinforcing value for that amount of money to gamble given the situation. In the current

study the crossover point is represented as the choice number at which the participant

began to choose the guaranteed money instead of the money to gamble with. Therefore,

a crossover score of 0 indicates that the participant would take $0.00 in the place of an

amount to gamble with, and a crossover score of 1 indicates a participant would need

$5.00 in order to choose the guaranteed money over the money to gamble with. Thus as

the crossover score increases by one point, the money value increases $5.00 to a possible

$150.00 (crossover score = 30). If a participant did not cross over they would receive a

crossover score of 31.

Each MCP survey consisted of 31 items. As noted, the choices made on the MCP

were hypothetical, as participants did not actually receive any of their choices.

Researchers have used the MCP effectively with college student populations (Benson et

al., 2009; Little & Correia, 2006). In the current study, the MCP was used as a primary

outcome measure to determine the relative reinforcing value of gambling as a function of

dose (amount of money available for gambling) and delays associated with the alternative

reinforcer. *Unnecessary=if they're reading this far in, they already know about it* ☺

The South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) is a widely

used, valid, and reliable measure of an individual's level of gambling pathology. The

SOGS is a twenty-item measure based on the DSM-III criteria for pathological gambling.

The SOGS includes six additional items that obtain information on frequency and type of

gambling, relationship problems, and credit debt. The SOGS has good internal

consistency (.97) and test-retest reliability (.71) (Lesieur & Blume, 1987). The SOGS

has also demonstrated acceptable validity and reliability among college students

(Ladouceur et al., 1994; Lesieur et al., 1991). Using the most commonly employed

scoring procedures, scores of 0-2 indicate no gambling problems, scores from 3-4 are

indicative of subclinical problem gambling, and scores greater than 5 indicate probable

pathological gambling (Lesieur & Blume, 1987). The SOGS provides critical data for gambling severity, game preference, frequency of gambling, and largest amount of money spent on gambling. In this study, we used the SOGS as a measure of problem gambling and as a primary outcome measure. The SOGS showed good internal reliability in the current study (cronbach's alpha = 0.716).

We used both the SOGS frequency items (1a through 1l) and a single item asking how often a participant had gambled in the past 28 days to measure the frequency of gambling behavior. The SOGS frequency items were scored on a 3 point likert scale (0 = not at all to 2 = once a week or more) for a variety of gambling activities. The average score across the 12 items was calculated for each participant. Other researchers have measured gambling frequency in a similar manner and found that these measures correlate with other measures of gambling (Moore & Ohtsuka, 1999; Neighbors, Lostutter, Larimer et al, 2002).

The Eysenck Impulsivity Questionnaire (EIQ; Eysenck & Eysenck, 1978) is a 63 item measure of impulsivity, empathy, and venturesomeness. For the purposes of the present study, we used the 19-item impulsivity scale. Items on the impulsivity scale are answered as 'yes' or 'no' and include questions such as "Do you often buy things on the spur of the moment?" and "Are you an impulsive person?" The EIQ has been shown to have good internal consistency and validity (Clarke, 2004; Eysenck, Pearson, Easting, & Allsopp, 1985). We used the EIQ to assess the relationship between the MCP and impulsivity, and as a control variable in assessing the predictive utility of the MCP in accounting for SOGS scores.

Procedures

The researcher used an available server and online service provided by the Department of Psychology (Sona System) to post informed consent, measures, and information about the study online. Participants logged onto the site to complete the study through the Sona System. The six MCP versions were presented to participants in random order to control for order effects. The system allowed individuals to participate only one time. This method of data collection also ensured the anonymity of the participants as no identifying information was linked to participant responses.

Compensation

Each individual who completed the online survey received one hour of extra credit through the Auburn University Sona System.

Statistical Analysis

All data was electronically collected and transferred into SPSS statistical software for analysis. We used Pearson correlations to assess the relationship between MCP scores, impulsivity and gambling behavior as specified in hypothesis one. We used repeated measures analysis of variance (ANOVA) to test hypotheses two and three. The dependant variable for the ANOVA was MCP crossover point, with the manipulations involving the amount of money offered to gamble and the delay associated with the alternative money serving as the independent variables. We also ran repeated measures ANOVAs with SOGS scores as a covariate in order to assess the effect of gambling behavior on the MCP as an exploratory analysis. Due to significant interactions effects that will be discussed later, we also split the data set by meaningful SOGS scores and ran the ANOVAs by group. Additionally, as an exploratory analysis designed to assess the

relationship between the MCP and gambling, we ran a regression including gender, EIQ,

and the MCP crossover point as predictors and SOGS score as the dependant variable.

Because this is the first time the MCP has been used to measure gambling behavior,

descriptive statistics based on crossover points are also presented.

RESULTS

Sample descriptive and exploratory statistics

Of the 270 participants who were asked about their gambling frequency, 78% reported no gambling behavior in the past 28 days. Of those reporting gambling behavior in the last 28 days, 23% reported gambling on average at least weekly. This constituted 5% of the total sample (11% of total males and 1.7% of total females). From the total sample twenty-six percent of males and 8.2% of females endorsed a score indicative of subclinical problem gambling on the SOGS (2-4); and 2.9% of males and 3.2% of females reported probable problematic gambling behavior on the SOGS (5 or more). The rate of problem gambling among this sample (3.1%) was similar to other research indicating that 3-6% of college students are estimated to be problem gamblers (Lesieur et al., 1991; Shaffer et al., 1999) and other studies that found approximately 3% of their participants reach probable problematic gambling levels according to SOGS score (Neighbors, Lostutter, Larimer, & Takushi, 2002; Winters et al, 1998).

Game of choice. Of the 270 participants asked about their game of choice, 134 reported no gambling or declined to answer. From the 136 participants indicating a game of choice, the most frequent game reported was poker (n = 53, 38.9%), followed by sports betting (n = 20, 14.7%), and blackjack (n = 18, 13.2%). When looking at the sample by gender, males who were asked about game of choice (n = 90) were mostly likely to report poker as their game of choice (n = 35, 38.9%), followed by sports betting

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(n = 14, 15.6%), with 24 (26.7%) reporting no gambling or declining to answer. For females asked about game of choice (n = 176), 112 (63.6%) reported no gambling or declined to answer. The most frequently noted game of choice for female participants was poker (n = 18, 10.2%), followed by slot machines (n = 13, 7.4%), and blackjack (n = 10, 5.7%).

We also split the data set into two groups according to SOGS scores. The first group consisted of individuals with SOGS scores ≤ 2 (non problem gamblers, n = 290); the second group consisted of individuals with SOGS scores > 2 (probable problem gamblers, n = 33). This split was based on Lesieur and Blume's (1987) article suggesting that SOGS scores of two or less are indicative of no problems with gambling and those with scores of three or more may be experiencing some problems. We looked at reported game of choice with the sample split by SOGS scores. From the non-problem gambling group, 236 participants were asked about game of choice, and of these, 125 (53%) reported no gambling or declined to answer. The most frequently reported game of choice for non-problem gamblers was poker (n = 44, 18.6%), followed by sports betting (n = 17, 7.2%), and blackjack (n = 15, 6.4%). For those in the probable problem gambling group, 30 participants were asked about game of choice, and nine (30%) reported no gambling or declined to answer. The most frequently reported game of choice for this group was poker (n = 9, 30%), followed by sports betting, blackjack, and other card games all with 2 participants (6.6% for each game).

Exploratory statistics. The current study provides a unique use of the MCP based on its adaptation for use with gambling as the target behavior. Throughout the results, means and standard deviations for MCP scores are reported as crossover points, which

are indications of choice points rather than dollar values but may be translated into approximate dollar values. For the whole sample, crossover points on the MCP were as expected with mean crossover points increasing as money to gamble increased from $10 [M = 3.22 (SD = 3.42)] to $25 [M = 4.72 (SD = 4.12)], and as delay to guaranteed money increased from no delay [M = 3.098 (SD = 2.93)] to one week delay [M = 3.77 (SD = 3.64)] to one month delay [M = 5.06 (SD = 5.03)]. These means are later used to test hypothesis two and three concerning the effect of increased money and delay on crossover points.

Some research indicates that a larger percentage of males gamble on a frequent basis than females (Labrie et al., 2003), therefore, we also split the MCP data by gender. We initially looked at reported frequency of gambling as measured by the SOGS frequency score. Males reported more frequent gambling [M= 4.56 (SD = 3.28)] than females [M = 3.04 (SD = 2.84)]. These means were significantly different (T = 4.28, p < .001). For males, average crossover point increased as amount of money to gamble increased from $10 [M = 3.64 (SD = 3.16)] to $25 [M = 5.43 (SD = 3.93)]. There was a main effect of money for male participants [$F(1,103) = 67.89$, $p < .001$, partial eta squared = 0.39, observed power = 1.00]. Mean crossover points also increased as delay to guaranteed money increased from immediate [M = 3.55 (SD = 2.76)], to one week [M = 4.18 (SD = 3.24)], to one month [M = 5.87 (SD = 4.88)]. A significant main effect of delay was also found [$F(2,102) = 28.49$, $p < .001$, partial eta squared = 0.36, observed power = 1.00]. The patterns were similar for females, with mean crossover points increasing as amount of money to gamble increased from $10 [M = 3.03 (SD = 3.53)] to $25 [M = 4.39 (SD = 4.17)]. The main effect for money was significant for female

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participants [$F(1,218) = 102.55$, $p < .001$, partial eta squared = 0.32, observed power = 1.00]. Mean crossover points for females also increased as delay to guaranteed money increased from immediate [M = 2.88 (SD = 2.99)], to one week [M = 3.58 (SD = 3.81)], to one month [M = 4.67 (SD = 5.06)]. We also found a significant main effect of delay for female participants [$F(2,217) = 27.32$, $p < .001$, partial eta squared = 0.20, observed power = 1.00].

Independent group t-tests were used to explore differences between male and female participants on average crossover points for the two amounts of guaranteed money. The average crossover for $10 versions found no significant difference between male and female participants (T = 1.50, p = 0.13); however, significant differences were found for the averages of the $25 versions (T = 2.13, p = 0.034). Independent group t-tests were also used to look at average crossover point within each of the three delays to guaranteed money. Significant differences were found between male and female participants for the one month delay (T = 2.02, p = .045), but not for immediate (T = 1.93, p = .054) or one week (T = 1.39, p = 0.17) delays. See table 6 for details.

In order to further explore differences between male and female participants, we used independent group t-tests for each of the 6 versions of the MCP. The three $10 versions of the MCP showed no significant differences for crossover point between male and female participants for each delay to guaranteed money [immediate (T = 1.17, p = 0.24); one week (T = 1.01, p = 0.32); one month (T = 1.81, p = 0.07)]. Two significant differences were found between gender within the three $25 versions of the MCP, with males having higher crossover points with immediate guaranteed money (T = 2.28, p = 0.02) and with a one month delay to guaranteed money (T = 1.99, p = 0.046). The $25

version with a one week delay showed no significant differences between gender (T = 1.60, p = 0.11).

We looked at the frequency score obtained on the SOGS for each group with the sample split by SOGS scores as explained earlier into non-problem and probable problem gamblers. The non-problem gambling group had significantly lower frequency scores [M = 3.29 (SD = 2.94)] than the probable problem gambling group [M = 5.58 (SD = 3.39)] (T = 4.15, p < .001). For participants with SOGS scores less than 2, mean crossover points increased as money to gamble with increased from $10 [M = 2.96 (SD = 2.89)] to $25 [M = 4.44 (SD = 3.79)]. Mean scores also increased as delay to guaranteed money increased from immediate [M = 2.88 (SD = 2.44)] to one week [M = 3.51 (SD = 3.20)] to one month [M = 4.71 (SD = 4.67)]. For participants with SOGS scores of 2 or more, mean crossover points increased as money to gamble with increased from $10 [M = 5.56 (SD = 5.99)] to $25 [M = 7.21 (SD = 5.76)]. Mean scores also increased as delay to guaranteed money increased from immediate [M = 4.98 (SD = 5.35)] to one week [M = 6.03 (SD = 5.92)] to one month [M = 8.14 (SD = 6.83)]. These means are discussed later within the exploratory analysis section where main effects of money and delay are reported for each group.

Independent group t-tests were used to explore differences between SOGS groups on average crossover points for the two amounts of guaranteed money. Significant difference was found in the average crossover for $10 versions between non-problem and probable problem gamblers (T = 4.24, p < 0.001); significant difference was also found for the average of the $25 versions (T = 3.74, p < 0.001). Independent group t-tests were also used to look at average crossover point within each of the three delays to guaranteed

money. Significant differences were found between non-problem and probable problem gamblers for all delays to guaranteed money; immediate (T = 3.99, p < 0.001), one week (T = 3.84, p < 0.001), and one month (T = 3.79, p < 0.001). See table 6 for details.

We used independent group t-tests to explore differences between SOGS groups within each of the six versions of the MCP. For the three $10 versions of the MCP, the two SOGS groups were significantly different for crossover point at all three delays to guaranteed money [immediate (T = 4.24, p < .001); one week (T = 3.34, p = .001); one month (T = 4.08, p < .001)].   Significant differences were found between SOGS groups within the three $25 versions of the MCP for all three delays to guaranteed money [immediate (T = 3.16, p = .002); one week (T = 3.89, p < .001); one month (T = 3.22, p = .001)]. In each of the above comparisons, the SOGS group with scores greater than 2 had larger mean crossover points. See table 6 for details.

Patterns for mean crossover points were similar within the $10 and $25 versions of the MCP; as delay to guaranteed money increased, mean crossover points increased for each amount to gamble with. See table 6 for mean crossover points on each dollar amount, each delay to guaranteed money, and each version of the MCP for the whole sample, by gender, and by SOGS score.

Hypothesis one

We hypothesized that the relative reinforcing value of gambling as indicated by crossover point on the MCP would be correlated with participants' level of impulsivity and gambling behavior as indicated by SOGS scores and frequency of gambling. We used a Pearson correlation matrix to determine correlation with each of the six MCP variants, EIQ, SOGS scores, and frequency of gambling.

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All six versions of the MCP (*r*'s range from .27 to .46, *p* < .001) and the average

MCP crossover point (*r* = .39, *p* < .001) were significantly correlated with SOGS scores.

The average MCP crossover point was also significantly correlated with reported

frequency of gambling in the last 28 days (*r* = .31, *p* < .001) and frequency items on the

SOGS (*r* = .31, *p* < .001). Impulsivity as measured by the EIQ was also significantly

correlated with all six versions of the MCP (*r*'s range from .170 to .289, *p* ≤ .002). The

EIQ was also significantly correlated with average MCP crossover (*r* = .24, *p* < .001).

See table 1 for more details.

Hypotheses two and three.

A 2 x3 repeated measure ANOVA was used to analyze the effects of the amount

of money offered for gambling ($10 vs. $25) and the delay associated with the alternative

monetary payment (immediate vs. 1 week delay vs. 1 month delay) on MCP crossover

points (see table 3). The values reported in the subsequent paragraphs are the choice

number at which participants crossed over from the gambling money to the alternative

money.

Effect of increasing money to gamble. Hypothesis 2 stated that scores on the

MCP would be higher as the amount of money offered for gambling increased. The

analysis revealed a main effect for money [$10 to gamble with, M = 3.22 (SD = 3.42);

$25 to gamble with, M = 4.72 (SD = 4.12)] [*F*(1,322) = 169.27, *p* < .001, partial eta

squared = 0.35, observed power = 1.00], indicating that as money increased from $10 to

$25, MCP crossover points increased.

Effect of increasing delay to alternative money. Hypothesis 3 stated that MCP

crossover points would be higher as delivery of alternative monetary amounts became

more delayed. We found a significant main effect for delay [no delay M = 3.10 (SD = 2.93), one week delay M = 3.77 (SD = 3.64), one month delay M = 5.06 (SD = 5.03)] [$F(2,644) = 85.96$, $p < .001$, partial eta squared = 0.21, observed power = 1.00]. This finding indicates that as delay to guaranteed money increased, MCP scores also increased.

We examined planned contrasts within the ANOVA in order to assess for specific differences between the three hypothetical delays to the guaranteed money. All contrasts were statistically significant at the $p < .001$ level. This finding indicates that the difference between each level of delay was significant.

A significant interaction for the money and delay factors was also found [$F(2,644) = 3.16$, $p = .043$, partial eta squared = .01, observed power = .605], indicating that the effect of increasing the amount of money to gamble with was not the same across all three levels of delay to guaranteed money. As depicted on Figure 1, it appears the crossover points for the $10 and $25 MCP versions were most divergent at the one month delay, indicating that dose effects become more pronounced at greater delays.

Exploratory Analyses

Main effect of money and delay while controlling for SOGS scores. An analysis was conducted to assess the effect of money and delay on the relative reinforcing value of gambling, while also controlling for the effect of reported gambling behavior. This was accomplished by re-running the original 2 x 3 repeated measures ANOVA, including SOGS scores as a covariate (see table 3). We found a main effect for the amount of money to gamble with while controlling for SOGS score [$F(1,321) = 138.79$, $p < .001$, partial eta squared = 0.30, observed power = 1.00], indicating that as the amount of

money increased from $10 to $25, MCP crossover points also increased, regardless of SOGS scores. The analysis also revealed a significant effect of delay [$F(2, 642) = 53.52$, $p < .001$, partial eta squared $= 0.14$, observed power $= 1.00$]. This indicates that as the delay to alternative money increased from immediate to one week and one month, the crossover point increased regardless of SOGS score. Finally, a significant three-way interaction [$F(2, 642) = 3.48$, $p = .031$, partial eta square $= .011$, observed power $= .650$] was found, indicating that the nature of the interaction between delay and money depended on SOGS scores.

ANOVA and interactions with SOGS groups. The significant three-way interaction prompted us to split the data by meaningful SOGS scores for further assessment. As described earlier, we split the data set into two groups(you don't need to repeat all this because you did describe it earlier and included all of this information). Repeated measures ANOVA were then run for each of the two groups (see table 4).

With the data set split, a main effect of money was found for both non-problem gamblers [$F(1,289) = 159.19$, $p < .001$, partial eta squared $= .36$, observed power $= 1.00$] and for probable problem gamblers [$F(1,32) = 12.88$, $p = .001$, partial eta squared $= .287$, observed power $= .936$]. We also found a significant effect for delay for both non-problem gamblers [$F(2,578) = 72.79$, $p < .001$, partial eta squared $= .20$, observed power $= 1.00$] and for probable problem gamblers [$F(2,64) = 14.35$, $p < .001$, partial eta squared $= .31$, observed power $= .998$].

With the data set split, a significant two-way interaction was also found for money and delay for the non-problem gamblers group [$F(2,578) = 3.77$, $p = .024$, partial eta squared $= .013$, observed power $= 687$]. However, we did not find a significant

interaction for the probable problem gamblers group [$F(2, 64) = .61$, $p = .549$, observed power = .147].

   Exploratory regression. A series of regressions were run to assess the predictive utility of the relative reinforcing value (or crossover points) for gambling in predicting problematic gambling behavior. SOGS scores served as the dependant variable (see table 5). We first put gender into the model, followed by EIQ score, followed by average MCP crossover score. The model showed a significant effect of gender (R^2 change = 0.029, p = .002). The addition of the EIQ led to a significant change in the amount of variance accounted for (R^2 change = 0.061, $p < .001$).

   The addition of the average MCP crossover also produced a significant change in the amount of variance accounted for (R^2 change = 0.105, $p < .001$). These findings indicate that the MCP crossover score adds significantly to the prediction of SOGS scores even when controlling for gender and impulsivity. While the average MCP crossover significantly added to the model, a separate regression utilizing each of the six versions of the MCP as predictors revealed that the version offering $10 to gamble with versus immediately available guaranteed money was most predictive of SOGS scores. In the model with gender and EIQ, this version of the MCP added significantly to predictive power (R^2 change = 0.158, $p < .001$).

DISCUSSION

Gambling behavior has been documented in nearly all cultures dating back to ancient times (Chamberlain, 2004). Researchers have defined gambling as engaging in a game of chance for monetary or other possible reward (O'Brien, 1998). To many people who gamble, it is a low risk form of entertainment. Therefore, not every individual who engages in gambling activity develops gambling related problems. However, repeated gambling behaviors may result in negative consequences for individuals and develop into problematic patterns. Gambling is common in the United States, with a reported 60 - 80% of adults and adolescents engaging in gambling at some point. However, only 5 - 7% of those individuals may experience negative consequences from the activity, and not all of these individuals reach diagnostic criterion for pathological gambling as outlined in the DSM-IV-TR. In fact, only about 0.4 - 3.4% of adults meet criterion for this disorder (APA, 2000). However, these rates rise dramatically when considering adolescents and college students (2.8 – 8%).

College students may have among the highest rates of pathological gambling, with some studies reporting more than two times the percentage of college students with a diagnosis as compared to general adult populations (Lesieur et al., 1991; Shaffer, Hall & Vander Bilt, 1999). Other studies have found that 90% of college samples report gambling, with 20% of those reporting weekly gambling behavior (LaBrie, Shaffer, LaPlante, & Weschler, 2003; Ladouceur, Dube & Bujold, 1994; Oster & Knapp, 2001).

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It is important to understand this phenomenon because of the associated negative consequences of problem gambling behaviors, such as more academic difficulty, heavier alcohol consumption, more nicotine and illicit drug use, and more unprotected sex than their non-problem gambling counterparts (Engwall, Hunter, & Steinberg, 2004; Labrie et al., 2003; Winters et al, 1998). A better understanding of gambling among college students may lead to more effective treatment and prevention efforts for this population.

Beyond collecting preliminary prevalence rates, relatively little has been done to study gambling among college students. Some work has been done to determine motives that may promote gambling among students (Neighbors et al, 2002). Some research has also been conducted that links impulsivity and gambling among college students (MacKillop et al, 2006). Yet given the apparent regularity of the problem, there is a dearth of research in the area. The current study provides an original use of the MCP to assess gambling in college students. Initial descriptive statistics in the use of the MCP are presented in order to be able to compare in future studies how this measure may work in alternative settings. Additionally, no research has been conducted with college students to determine how behavioral principles may be applied to gambling among students. Through the use of the MCP, the current study includes a preliminary attempt to address behavioral economic principles that might help explain gambling among college students.

Extensive research indicates that behavioral economic principles can be applied to substance use (Bickel, DeGrandpre, & Higgins, 1993; Bickel, DeGrandpre, Hughes, & Higgins, 1990; Bickel, Madden, & Petry, 1998; Greewald & Hursh, 2006; Hursh, 1993). Because substance use addictions and problematic gambling share a number of

similarities, (i.e. similar clinical presentations, similar brain activations) (Betz et al, 2000; Blanco et al, 2001; Grant & Potenza, 2005; Potenza, 2006), it seems reasonable that behavioral economic principles may also be applied to gambling behavior.

Three principles from behavioral economics are particularly important: reinforcer value and cost, availability of a reinforcer and alternative reinforcers, and delay discounting. Through the use of six versions of the MCP ($10 vs. $25 and immediate vs. 1 week vs. 1 month delay) the current study attempted to address each of these principles. The MCP has been used to study a number of drugs, including alcohol (Benson, Little, Henslee, & Correia, 2009; Little & Correia, 2006), cocaine (Jones, Garrett, & Griffiths, 1999), and caffeine (Garrett & Griffiths, 1998). No one to date has attempted to use the MCP for gambling behavior. The current study showed that gambling-related choice behavior is sensitive to some of the same manipulations that have been shown to influence substance-related choice behavior.

Findings

Descriptive and preliminary exploratory statistics. In the current study, we found the sample of students to be similar to other studies in terms of percentage of problem gamblers (3.1%). In terms of game of choice, poker was clearly the most popular game reported regardless of the gender or SOGS score. Sports betting and blackjack were also frequently reported as games played by this sample. It is likely that poker was the most popular game of choice because of the common nature of local poker games among college students. Future studies may find that other forms of gambling are more popular in other areas, such as those living in close proximity to casinos, or as online gambling becomes more popular.

The frequency of gambling as measured by the SOGS was as expected with male participants and those with SOGS scores greater than 2 reporting more frequent gambling behavior than female participants or those reporting SOGS scores of 2 or less. Relatedly, probable problem gamblers reported significantly higher MCP crossover points on all six versions of the MCP, across delay and amount. This indicates that probable problem gamblers gave greater subjective value to the gambling in all conditions than did non-problem gamblers. We also found that male participants reported higher MCP crossover points for the $25 version of the MCP and for those versions with a one month delay. This finding indicates that as the amount of time to guaranteed money increased, the spread between crossover points for male and female participants also increased, indicating that male participants showed greater delay discounting than female participants. Additionally, a greater dose effect was seen in male participants as indicated by a similar increase in discrepancies of crossover points from the $10 to $25 versions of the MCP. This may indicate that male participants felt more confident in making money with $25 to gamble with as opposed to $10 to gamble with.

The MCP for Gambling Behavior. The MCP has been used to assess behaviors with a range of drugs, including alcohol (Benson et al., 2009; Little & Correia, 2006), cocaine (Jones et al., 1999), and caffeine (Garrett & Griffiths, 1998). However, to date no research has used the MCP to assess gambling behavior. As the initial application of the MCP with gambling behavior, descriptive information regarding the MCP with this population is an important contribution to the literature. It was not certain how crossover points would be distributed or what groupings would be of interest because the MCP had not previously been used with gambling behavior. The descriptive data for crossover

points is important to future research using the MCP for gambling as a point of reference for possible scores. The findings are similar to other MCP studies that reported substance-related dose effects and delay effects. In the current study, mean crossover points increased as money to gamble with increased and as delay to guaranteed money increased. Additionally, differences noted between male and female participants were as expected, with males reporting higher crossover values. This finding supports other research that males may gamble more than women (Labrie et al., 2003). Finally, the individuals with SOGS scores of two or more responded with higher MCP crossover points than those with scores below two. Participants responded in a pattern that would be expected given the assumptions about gambling behavior. Future researchers using the MCP for gambling behavior may expect to find similar distributions of scores.

Correlations between MCP scores and Gambling. In order to assess if the MCP crossover points for gambling increase as problematic gambling increases, we ran correlations between MCP crossover points and SOGS scores. We expected MCP crossover points to increase as gambling problems/behavior increased, as measured by the SOGS and frequency questions. Crossover points for all six versions of the MCP, and the average crossover point, were significantly positively correlated with each other, SOGS score, self-reported gambling for the past 28 days, and gambling frequency items from the SOGS. This finding is important because it is similar to findings from other studies that indicate that versions of the MCP dealing with alcohol are correlated with measures of use and problems associated with alcohol (Little & Corriea, 2006). Thus, for gambling and alcohol use, choice behavior assessed by the MCP is related to actual

behavior in the natural environment. These findings support further use of the MCP to study gambling-related choice behavior.

Dose and Delay Effects for Gambling. A goal of the current study was to determine if responses to an MCP designed to assess the relative reinforcing value of gambling are sensitive to factors that have been shown to influence responses on drug-related versions of the MCP, and choice behavior in general. We hypothesized and found that as the amount of money to gamble with increased, the MCP crossover point also increased. This effect is similar to dose effects seen in other studies using the MCP (Benson, Little, Henslee, & Correia, 2009; Garrett & Griffiths, 1998; Jones, Garrett, & Griffiths, 1999; Little & Correia, 2006). This finding supports the idea that behavioral principles may be significant for gambling behavior, because larger amounts of a behavior are subjectively more valuable.

Delay effects were also similar to those reported in other studies using the MCP (Benson et al, 2009; Garrett & Griffiths, 1998; Jones et al, 1999; Little & Correia, 2006). We found that as delay to an alternative reinforcer increased, the relative reinforcing value of gambling increased. Thus, we find that gambling behavior may act as a reinforcer, similar to other substances, by producing discounting of delayed rewards when gambling is immediately available.

Within the full sample, we found a significant interaction between money and delay. This finding suggests that the effect of the amount of money to gamble with is different according to the delay to an alternative reinforce. The plots indicate that as the delay to guaranteed money increases, a larger amount of money to gamble with is chosen

more often than would be expected. However, in the current study this finding had a small effect size, so the interaction is not likely to be clinically important.

We also found a three-way interaction for delay and money with SOGS scores. Because of this interaction, we split the sample by meaningful SOGS scores for further analysis. We split the data set into two groups (group 1 = individuals with SOGS score $\leq$ 2, n = 290; group 2 = individuals with SOGS score > 2, n = 33). This split was based on Lesieur & Blume's (1987) original article suggesting that SOGS scores of two or less are indicative of no problems with gambling, and those with scores three or more may be experiencing some problems. The main effects of money and delay were upheld in both samples with the data set split. We also found a significant interaction for money and delay in the non-problematic group. While the finding is statistically significant, it is not necessarily clinically interesting because the non-problematic group is not typically the group of interest. The ultimate group of interest is problem gamblers, as measurement of gambling and prediction of problems is more meaningful for a clinical sample. Within the problematic gamblers group, the interaction term was not significant. While the analysis used to produce this finding was under-powered from a statistical standpoint, it is not likely that it would reach significance with a larger sample. This finding suggests that money offered to gamble with and delay to alternative rewards act independently in predicting relative reinforcement of gambling for problematic gamblers. Therefore, for problematic gamblers, the MCP may be a good instrument for assessing the relative reinforcing value of gambling. Additionally, we see that broad principles of behavioral economics (delay discounting, value of a reinforcer, and available alternatives) may be important determinants of the reinforcing value of gambling behavior.

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It is also interesting to consider the dollar amount with which each crossover

point is associated. For the $10 version of the MCP, the average crossover point was

3.22, which is equivalent to just over $15 in guaranteed money. For the $25 version, the

average crossover point (4.72) was associated with approximately $25 in guaranteed

money. Interestingly, this is similar to Little and Corriea's (2006) findings, where the

lowest dose of alcohol (6 ounces of beer) was worth approximately $0.75 and the higher

dose (12 ounces of beer) was worth approximately $1.00. In both studies, the relative

reinforcing value of the target behavior did not increase in direct proportion to the

amount of gambling money or alcohol that was available. Based on these findings, future

researchers may wish to address the possibility that there is a level of satiation that may

be reached with gambling or alcohol, if the amount (or dose) were to be increased

sufficiently. Such research may utilize the MCP. Researchers may wish to create

versions of the MCP with increasingly larger amounts of gambling or alcohol until

inordinately large amounts are reached and crossover points are no longer significantly

different from one version to another (thousands of dollars or cases of beer). While such

research would be particularly interesting in lab trials, the large amount of reward offered

may be cost prohibitive.

Implications of the Findings

Gambling and behavioral economics. Based on the current study, it is possible to

apply behavioral economic theory to gambling behavior. By using the MCP, we were

able to determine that individuals presented with gambling as a possible behavior act

similarly to individuals presented with substance use as a behavior. We were able to

determine that gambling behavior has an associated subjective value and cost.

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Additionally, we were able to influence the subjective value of gambling through manipulation involving the temporal availability of alternative reinforcers. A reinforcer's relative value is subject to the cost of obtaining the reinforcer. In the current study, the cost of choosing gambling was giving up the alternative guaranteed money. We found that as the cost of gambling increased, people began to choose the alternative behavior. This would be expected if a behavior follows economic principles and has been demonstrated in both humans and animals (Bigelow & Liebson, 1972; Meisch & Thompson, 1973).

We also demonstrated that almost all individuals will crossover from choosing gambling to choosing guaranteed money at some point. These findings support the idea that available alternative reinforcers may decrease potentially addictive behaviors because a person may choose to disperse their resources among competing reinforcers. Additionally, as the alternative reinforcer became more valuable (alternative money increased, or delays were eliminated) individuals were more likely to choose that option. This is similar to other findings demonstrating that available alternative reinforcers may decrease the occurrence of a target behavior (Bickel et al, 1995; Carroll, 1996; Carroll et al, 2001; Correia et al, 2003; Correia et al, 2005; Higgins et al, 2003; Murphy et al, 2006; Vuchinich & Tucker 1988). If this is true of gambling behavior, it may hold significant treatment implications for problematic gamblers. However, research is needed to directly assess the effect of alternative reinforcers on gambling behavior in a clinical sample; treatment implications will be discussed later.

Crossover points are also demonstrations of the economic principle of cross-price elasticity of demand, which refers to how the demand of a given commodity will change

as the overall value of another commodity changes (Hursch, 1993). In this theory, commodities (behaviors) may be compliments or substitutes. If behaviors are compliments, their demand varies together and as one behavior is eliminated so is the other (e.g. cigarette smoking and alcohol). If two commodities are substitutes, then as one is less sought out, the other is more sought (e.g. running and playing basketball) (Vuchinich & Tucker, 2003). This theory was evaluated for substance use in a reevaluation of 16 drug self-administration studies (Bickel, DeGrandpre, & Higgins, 1995). Substitute effects were found for some drugs such as; sucrose and ethanol, and PCP and ethanol. Compliment effects were found for cigarettes and alcohol, heroin and food, and ethanol and water. Similarly, in gambling it may be possible to identify if other available reinforcers act as compliments or substitutes. This theory could prove useful in determining how alternative reinforcers interact with gambling, and which alternative behaviors may be best suited to aid in the reduction of problematic gambling. In the future, researchers may focus on creating curves that demonstrate cross-price elasticity of demand for gambling and other behaviors.

Finding crossover points for nearly all subjects also suggests that as the price of gambling increases (the loss of greater amount of alternative money), the demand for the behavior decreases, thereby acting like other commodities that may be mapped onto demand curves. Demand curves have been used in economics for several years to demonstrate the elasticity of a commodity. In fact, original documentation of such theory was published as early as 1871 (Jevon, 1871). Using economic demand curves to study substances has been a more recent development (DeGrandpre, Bickel, Hughes, & Higgins, 1992; Greenwald, 2008). Demand for a number of substances has also been

noted to decrease as their relative costs increase (Chaloupka, 1991; Leung & Phelps, 1993; Saffer & Chaloupka, 1999). Therefore, in the current study individuals responded to gambling behavior in a similar manner to individuals responding to substance use behavior; this pattern of responding is readily adapted to behavioral economics. Further studies may be done to map out demand curves for different amounts of gambling or different types of gambling behaviors.

The current study also found a main effect of delay associated with the guaranteed money, indicating that as alternative money became more delayed, people discounted the value of the alternative. Because the subjective value of the delayed alternative money had decreased, individuals tended to choose the gambling behavior longer (i.e., higher crossover points). This finding is a demonstration of delay discounting as outlined by Strotz (1955) when he observed that as delay to return on an investment increases, the subjective value of that investment decreases. This principle has been shown to be very robust, and has been demonstrated in a number of studies on the reinforcing value of substance use (e.g. Bickel, Odum, & Madden, 1999; Chutuape, Mitchell, & de Wit, 1994; Heil, Johnson, Higgins, & Bickel 2006; Mitchell, Fields, D'Esposito, & Boettiger, 2005; Odum, Madden, Badger, & Bickel, 2000; Vuchinich & Simpson, 1998; Vuchincih & Tucker, 1983).

While the current study did not directly compare problem gamblers and non-problem gamblers, it did show that people generally tend to discount delayed rewards when presented with gambling as a behavioral option. Studies have used delay discounting tasks to demonstrate greater levels of delay discounting in problem gamblers (Dixon et al, 2003; Petry, 2001; Petry & Casarella, 1999). The current study indicates

that gambling is a behavior with enough reinforcing value to elicit delay discounting in participants. The fact that the MCP results for this study are similar to others in terms of delay also lend support for further use of the MCP in assessing gambling behavior.

In summary, the current study demonstrates the utility of the application of the behavioral economic theory to gambling. The findings suggest that gambling has a relative reinforcing value that can be manipulated according to the cost and availability of gambling. It also demonstrates that the presence of alternative reinforcers has a direct impact on choice behavior with gambling. Additionally, gambling behavior is sufficiently valuable that individuals engage in delay discounting of alternative monetary rewards when they may choose to gamble. Further research should be conducted to replicate these findings and to expand them as outlined above.

Possible treatment implications. The current study may have potential implications for the treatment of problematic gambling. Though the sample in the current study is not a clinical sample, the principles of behavioral economics demonstrated herein are widely applicable and may therefore be able to inform treatment. Currently, a number of treatments are available for problem gambling, including cognitive-behavioral therapy (Petry, 2005; Petry et al, 2006; Sylvain, Ladouceur, & Boisvert, 1997), behavioral interventions (Mconaghy, Armstrong, Blaszczynski, & Allcock, 1983), Gamblers Anonymous, and Motivational Interviewing (Diskin, 2006). However, to date no studies have assessed contingency management as a form of treatment. The current study suggests that contingency management may be effective because of the similarities that gambling behavior has to substance-based addictions. This idea is not new; Petry first suggested the use of contingency management for pathological gambling in 2002.

Contingency management is based on behavioral principles suggesting that addictive behaviors are susceptible to environmental manipulations (Higgins, 1997; Stitzer & Higgins, 1995). Contingency management treatment programs use reward and punishment to increase abstinence or treatment compliance among clients. The rewards are contingent upon an individual's performance on a given criterion, such as a negative urine sample. The treatment is based on the idea that if a desirable action (drug abstinence) can be rewarded enough, it may be maintained until the target behavior (drug use) becomes extinct. In many cases, a voucher system has been used as reinforcement (Bickel, Amass, Higgins, Badger, & Esch, 1997; Budney, Higgins, Radonovich, & Novy, 2000; Higgens et al, 1994; Preston, Umbricht, & Epstein, 2000). The vouchers may be delivered with increasing value according to increasing consecutive negative urine samples (Silverman et al, 1998). However, with gambling it is not possible to physiologically measure abstinence. Therefore, another method would need to be used. In some contingency management studies, individuals have been reinforced for treatment compliance (Azrin, Sisson, Meyers, & Godley, 1982); this may be an important feature when using contingency management with gamblers. Gamblers may be rewarded for completing homework assignments, participating in alternative activities, documented ability to maintain money in a bank account or pay bills, or based on their abstinence as reported by a third party such as a spouse or roommate.

Contingency management has been effective in decreasing use of a number of substances including cocaine (Higgins et al, 1994; Silverman et al, 1998), marijuana (Budney, Higgins, Delaney, Kent, & Bickel, 1991), heroin (Silverman et al, 2002), and alcohol (Petry, Martin, Cooney, & Kranzler, 2000). The current study has demonstrated

that gambling is susceptible to environmental manipulation and therefore may be treated with behavioral techniques such as contingency management. Studies using contingency management with clinical samples of gamblers and comparing this to other forms of treatment such as cognitive behavioral therapy or in conjunction with cognitive behavioral therapy would add greatly to the current body of research.

Helping clients to increase alternative behaviors, as has been done with alcohol studies (Correia et al, 2005), may be another effective way to decrease problematic gambling. Techniques used in behavioral activation therapy for depression may help to increase the number of alternative reinforcing activities in gamblers. A number of manuals and articles are available detailing the implementation of behavioral activation. The dominant procedures include conducting an analysis of activities, identifying additional activities, tracking the individual's progress, and rewarding progress to increase their activity (Hopko, Lejuez, Ruggiero, Eifert, 2003; Lejuez, Hopko, & Hopko, 2001; Lejuez, Hopko, LePage, Hopko, & McNeil, 2001). These techniques are easily adapted to gambling, as they are simply geared toward increasing activity. This technique may be use as a stand-alone treatment, especially when working from a harm reduction model. However, with more severe problematic gambling it may be better used in conjunction with other forms of treatment as opposed to a stand-alone treatment.

Developing and assessing such interventions should be a focus of further research. Further research may also look at harm reduction techniques similar to those used in alcohol treatment; this type of intervention seems of particular interest for college students. The findings of the current study support the idea that substance use disorders

and pathological gambling are similar in a number of ways and may therefore be treated from similar conceptual frameworks as suggested by Petry (2002).

Limitations and Future Direction

The current study employed online self-report measures to obtain participant data. In general, self-report data has been criticized because of possible inconsistencies in responding. However, Kazdin (1992) notes that self-report measures are important for measuring the inner processes of individuals. The problem with such measures is not inherent, but is instead the lack of evidence that a specific measure in fact assess the characteristic of interest. The use of well-validated measures of gambling behavior alleviate some of the concerns associated with self-report. Use of self-report questionnaires may not be ideal, but because of the subjective nature of impulsivity and relative reinforcing value, self-reports may be effective tools. Additionally, because of the primacy of the research question, self-report data is an important first step.

This study also made use of internet-based self-report. It is important to note that no direct controls were available to ensure the reliability of reporting. However, no practically significant discrepancies existed in the amount of time taken to complete the measures. It is also important to note that more studies are being conducted that help to support the idea that electronic- and online-based data collection produce similar results to paper and pencil self-report (Bates & Cox, 2008; Gwaltney, Shields, & Shiffman, 2008; Luce et al, 2007). Gwaltney et al. (2008) conducted a meta-analysis including 65 studies that compared electronic-based and paper pencil self-report; the researchers found that there were no statistically or clinically significant differences between the two

methods of assessment. Future studies may attempt to assess the reliability of internet-based reporting for the MCP and compare this to paper and pencil formats.

Measurement of gambling behavior has been a debated subject (Engwall et al, 2004; LaBrie et al., 2003; Slutske et al, 2003). Within that debate, the SOGS has been criticized for a number of reasons. Therefore, the use of the SOGS in this study may be considered a limitation to the accuracy of reported problematic gambling. However, the SOGS is also the most commonly used assessment tool for problematic gambling (Shaffer et al, 1999). Additionally, it has been demonstrated to have good psychometric properties (Lesieur & Blume, 1987). Therefore, the SOGS appeared to be the best of the currently available measures of gambling behaviors. The SOGS also worked well in the current study; it displayed adequate internal reliability and was correlated with the reported frequency of gambling behavior. Future studies may benefit from the use of other measures of problematic gambling such as the gamblers time line follow back or diagnostic interviews in order to increases the internal and external reliability of the study.

The sample characteristics are a limitation to the generalizability of the findings. While the sample somewhat approximates the general undergraduate sample of Auburn University, it is not necessarily representative of other universities and certainly not of general populations. Another limitation of the sample is the overrepresentation of female participants. While it is not uncommon to have a majority of females participate in research on college campuses, the study sample was predominantly female. This is particularly important for this research because there is some evidence that college males tend to exhibit problem gambling behavior at a higher rate than females (Lesieur et al,

1991; Winters et al, 1998). In order to create a more representative sample, this study would have benefited from more targeted recruitment of males. Additionally, the current sample is a non-clinical sample with 97% of participants reporting SOGS scores below five. Future research would benefit from screening for pathological gamblers and using more clinically significant samples. Additional studies that compare gamblers, non-gamblers, and pathological and non-pathological gamblers responses on the MCP will add to the current line of research. While the current sample poses a threat to external validity, it is also important to note that the present research question is based on broadly applicable behavioral theories. Therefore, it is reasonable to expect that the general relationships reported in the current study would apply to more clinical samples. However, it is also possible that the values observed within those relationships might change. For example, the crossover points may be consistently higher among clinical samples but still sensitive to changes in the amount of gambling money available and the delay associated with the alternative reinforce.

The MCP has been used both in-vivo and hypothetically to measure relative reinforcing value of a number of substances (i.e. Benson et al, 2009; Garrett & Griffiths, 1998; Jones et al, 1999; Little & Correia, 2006). In the current study, the hypothetical use of the MCP was warranted due to the primacy of the research question. However, hypothetical use of the MCP may be seen as a threat to the validity of the findings, as individuals may react differently when actually presented with one of their choices. It is uncertain how this might affect the results. It may be postulated that the choice of the gambling money over the guaranteed money could create a scenario similar to gambling where a person risks certain money for the chance to get an even higher payout. If this

were the case, then differences between gamblers and non-gamblers may be more pronounced. One study directly compared the use of the MCP in a hypothetical situation and a laboratory (in-vivo) session. Little and Correia (2006) found that the two forms of the MCP for alcohol displayed relationships to alcohol measures and were effected by delay. However, the two measures were not correlated within subjects. They concluded that hypothetical and in-vivo use of the MCP may assess different processes of choice. Future studies should use the MCP both hypothetically and in-vivo to look for possible differences with gambling behavior.

Future research should also take into account other possible covariates such as alcohol and substance use. Some research has shown that pathological gamblers who also abuse substances tend to discount delayed rewards more significantly than pathological gamblers without substance abuse issues (Petry & Casarella, 1999). The current study did employ alcohol use patterns as a covariate within the analyses. While direct comparison of gambling and substance use is difficult, future researchers may choose to give alcohol and gambling versions of the MCP to the same subjects to assess within group differences in response patterns. This would more directly assess the implied research question in this study, which was to determine if behavioral economic theory and related measures could be applied to gambling as they have been applied to substance use.

In summary, the MCP was shown to measure gambling behavior, or the relative reinforcing value of gambling, in a systematic fashion. Crossover points were correlated to the frequency of gambling and the severity of gambling-related problems. Additionally, the MCP crossover points mirrored broad patterns of behavior that are

commonly seen in substance abusers, such as delay discounting and dose sensitivity. These similarities suggest that common behavioral principles and mechanisms underlie addictive behaviors such as substance use and gambling. Future research may choose to apply the MCP to other "behavioral addictions" such as pornography and internet use. These behaviors, much like gambling, do not yet have firmly validated measures of assessment, and have not been examined within the behavioral economic framework. The field of addictions would benefit from the validation of a measure such as the MCP for these behaviors.

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APPENDICES

APPENDIX A: TABLES and FIGURES

Table 1
Mean and SD for MCP Crossover Point and Approximate Dollar Value (Whole Sample)

	Mean	SD	~$ value
MCP10i	2.37	2.93	$ 10
MCP10w	3.13	3.53	$ 15
MCP10m	4.18	4.66	$ 20
MCP10 average	3.22	3.42	$ 15
MCP25i	3.83	3.47	$ 20
MCP25w	4.41	4.12	$ 20
MCP25m	5.93	5.91	$ 30
MCP25 average	4.72	4.12	$ 25

N = 323
MCP10 = MCP version with $10 to gamble; MCP 25 = MCP version with $25 to gamble
i = no delay to alternative; w = one week delay to alternative; m = one month delay to alternative
Therefore MCP10i would be the MCP version with $10 to gamble and an immediate delay to guaranteed money.

Table 2
Correlations among MCP, SOGS, and EIQ

	1	2	3	4	5	6	7	8	9	10	11
1. SOGS	---										
2. MCP10i	.461**	---									
3. MCP10w	.372**	.782**	---								
4. MCP10m	.361**	.680**	.845**	---							
5. MCP25i	.301**	.678**	.743**	.678**	---						
6. MCP25w	.366**	.677**	.817**	.771**	.789**	---					
7. MCP25m	.271**	.557**	.761**	.808**	.693**	.772**	---				
8. MCP Avg	.389**	.792**	.925**	.913**	.851**	.910**	.896**	---			
9. EIQ	.252**	.289**	.257**	.207**	.170*	.209**	.187*	.242**	---		
10. Freq28	.407**	.277**	.193**	.372**	.218**	.289**	.309**	.314**	.075	---	
11. FreqSOGS	.340**	.236**	.247**	.299**	.256**	.297**	.273**	.307**	.140*	.337**	---

N = 323; * p < .01; ** p < .001
MCP10 = MCP version with $10 to gamble; MCP 25 = MCP version with $25 to gamble
i = no delay to alternative; w = one week delay to alternative; m = one month delay to alternative
Therefore MCP10i would be the MCP version with $10 to gamble and an immediate delay to guaranteed money.
EIQ = Eysenck Impulsivity Questionnaire
Freq28 = reported frequency of gambling in past 28 days
FreqSOGS = SOGS gambling frequency items

Table 3

Repeated Measures ANOVA (Full Sample) with and without SOGS Covariate

Without SOGS as covariate

	F	*p*	$\acute{\eta}^2_p$	Power
Effect of Money to gamble with	169.273	.000	.345	1.00
Effect of Delay to alternative	85.956	.000	.211	1.00
Money x Delay	3.155	.043	.010	.605

With SOGS as covariate

	F	*p*	$\acute{\eta}^2_p$	Power
Effect of Money to gamble with	138.795	.000	.302	1.00
Effect of Delay to alternative	53.516	.000	.143	1.00
Money x Delay x SOGS	3.477	.031	.011	.650

N = 323

Table 4

Repeated Measures ANOVA (Split Sample)

SOGS score ≤ 2 (n = 299)

	F	p	$\acute{\eta}^2_p$	Power
Effect of Money to gamble with	159.187	.000	.355	1.00
Effect of Delay to alternative	72.190	.000	.200	1.00
Money x Delay	3.765	.024	.013	.687

SOGS score > 2 (n = 33)

	F	p	$\acute{\eta}^2_p$	Power
Effect of Money to gamble with	12.880	.001	.287	.936
Effect of Delay to alternative	14.349	.000	.310	.998
Money x Delay x SOGS	.606	.549		.147

N = 323

Table 5

Regression Analysis Predicting SOGS score

Variable	B	SE B	β	T	Model R^2
Step 1					.029**
Gender	-.521	.170	-.169	-3.069**	
Step 2					.089***
Gender	-.497	.165	-.161	-3.015**	
Impulsivity (EIQ)	.098	.021	.247	4.623***	
Step 3					.194***
Gender	-.395	.156	-.128	-2.531*	
Impulsivity (EIQ)	.066	.021	.167	3.219***	
Average MCP	.133	.021	.336	6.445***	

N = 323

p < .05; ***p* ≤ .01; ****p* < .001;

All significance testing for Model R^2 are for the full model; statistics for R^2 change are presented in the text.

Table 6
Average MCP Crossover Point and SOGS Frequency Scores

	Male	Female	T score	SOGS $\leq$ 2	SOGS > 2	T score	Whole Sample
Average MCP scores							
MCP10 average	3.64 (3.16)	3.03 (3.53)	1.50	2.96 (2.89)	5.56 (5.99)	4.24***	3.22 (3.42)
MCP25 average	5.43 (3.93)	4.39 (4.17)	2.13*	4.44 (3.79)	7.21 (5.76)	3.74***	4.72 (4.12)
MCP immediate average	3.55 (2.76)	2.88 (2.99)	1.93	2.88 (2.44)	4.98 (5.35)	3.99***	3.10 (2.93)
MCP week average	4.18 (3.24)	3.58 (3.81)	1.39	3.51 (3.20)	6.03 (5.92)	3.84***	3.77 (3.64)
MCP month average	5.87 (4.88)	4.67 (5.06)	2.02*	4.71 (4.67)	8.13 (6.83)	3.79***	5.06 (5.03)
Individual MCP versions							
MCP10i	2.64 (2.73)	2.24 (3.02)	1.17	2.14 (2.23)	4.36 (6.06)	4.24***	2.37 (2.93)
MCP10w	3.41 (3.11)	2.99 (3.71)	1.01	2.91 (3.08)	5.06 (5.92)	3.34***	3.13 (3.53)
MCP10m	4.86 (4.59)	3.85 (4.67)	1.81	3.83 (4.20)	7.24 (6.96)	4.08***	4.18 (4.66)
MCP25i	4.46 (3.39)	3.53 (3.47)	2.28*	3.62 (3.10)	5.61 (5.52)	3.16**	3.83 (3.47)
MCP25w	4.94 (3.81)	4.16 (4.24)	1.60	4.12 (3.70)	7.00 (6.24)	3.89***	4.41 (4.12)
MCP25m	6.88 (5.65)	5.48 (5.99)	1.99*	5.58 (5.68)	9.03 (6.98)	3.22**	5.93 (5.91)
SOGS Frequency	4.56 (3.28)	3.04 (2.84)	4.28***	3.29 (2.94)	5.58 (3.39)	4.15***	3.52 (3.07)

N = 323; *p < .05; **$p \leq$ .01; ***p < .001
Average crossover scores are averaged across the two amounts (three versions) and three time delays (two versions).
MCP10 = MCP version with $10 to gamble; MCP 25 = MCP version with $25 to gamble
i = no delay to alternative; w = one week delay to alternative; m = one month delay to alternative
Therefore MCP10i would be the MCP version with $10 to gamble and an immediate delay to guaranteed money.

Figure 1

Repeated Measures ANOVA Plot (whole sample)
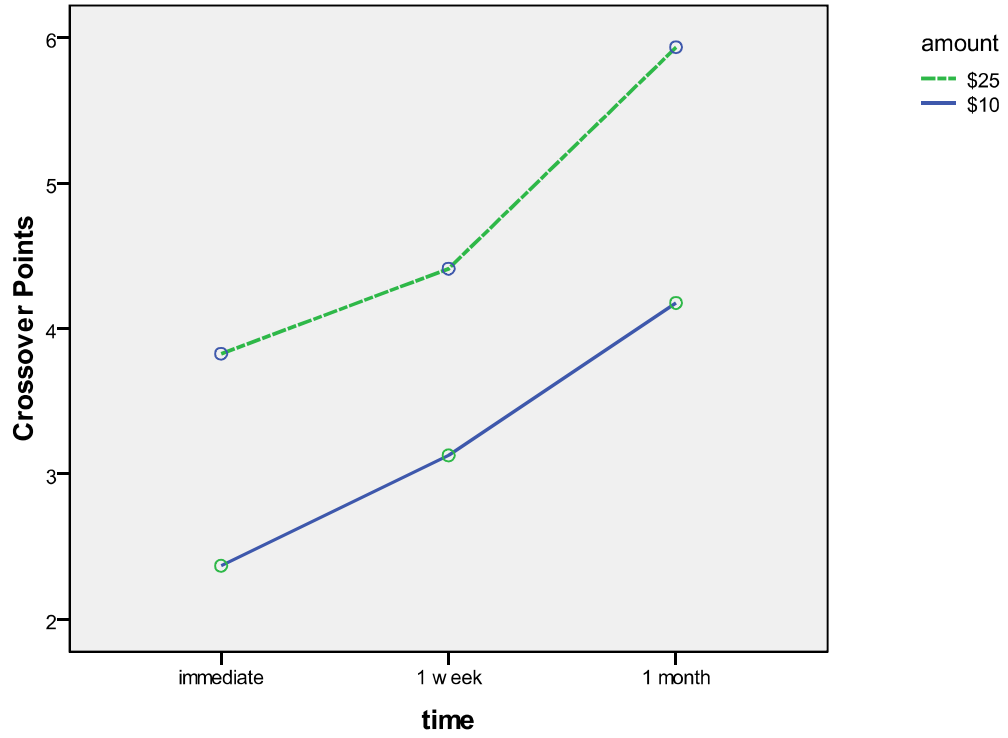
N = 323
Y axis = average crossover points
X axis = delay to guaranteed money

Auburn University

Auburn University, Alabama 36849-5214

Department of Psychology
226 Thach

Telephone: (334) 844-4412
ATTNet: 221-4412
FAX: (334) 844-4447

INFORMATION LETTER
For a Research Study Entitled:
Using the Multiple Choice Procedure to Measure College Student Gambling

You have been invited to participate in a research study regarding the assessment of gambling among college students. We hope to learn more about the underlying motivation for college student gambling. This study is being conducted by Leon Butler, a graduate student at Auburn University and Dr. Chris Correia, an associate professor in the psychology department. You were selected as a possible participant because you are: 1) an Auburn University undergraduate student, and 2) you are at least 19 years old.

If you decide to participate in this research project read through this information letter. By clicking continue you are giving consent to participate in this study and for the investigator to use the information as outlined in this information letter. Please complete the anonymous questionnaires; the packet contains several questionnaires about your gambling behavior and alcohol use. You will receive 1 hour of extra credit for your time and participation.

The risks of participating in this study are minimal. You may find answering questions about your alcohol use and gambling distressing. In case you should become concerned, we will provide all students with information on how to contact the appropriate on and off-campus resources for support. You will be responsible for initiating and paying for any support. Breaches of confidentiality are highly unlikely because the study is anonymous and no identifying information is being linked to any responses. Credit will be granted strictly through the Sona System. Participation in this study is completely voluntary, and you have the option to withdraw your consent to participate at any time. If you decide to withdraw from the study you will not be penalized.

You will be compensated for 1 hour of research participation, which earns extra credit in many psychology classes. Check with your course instructor(s) to determine how the extra credit may be applied.

To protect confidentiality of all participants, anonymous surveys will not be linked to any type of identifying information. Names of participants will only be kept on the Sona System for extra credit purposes. All information gathered will be kept in password protected databases. Information about this study may be published in a professional journal, and/or presented at a professional meeting. If so, only group data will be presented, and no individual participant will be identified.

Your decision whether or not to participate will not jeopardize your future relations with Auburn University or the Department of Psychology. If you have questions, Leon Butler (844-4823, butlelh@auburn.edu) or Dr. Chris Correia (844-6480, correcj@auburn.edu) will be happy to answer them.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

If you would like you may print a copy of this Information Letter and retain it for your records.

HAVING READ THE INFORMATION PROVIDED YOU MUST DECIDE WHETHER YOU WISH TO PARTICIPATE IN THIS RESEARCH PROJECT.

BY CLICKING CONTINUING YOU ARE INDICATING YOUR WILLINGNESS TO PARTICIPATE.

<div align="right">

The Auburn University
Institutional Review Board
has approved this document for use
from April 17, 2009 to April 16, 2010
Protocol #09-118 EP 0904

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APENDIX C: MEASURES

Demographic Questionnaire

1. Please indicate your gender:

○ Male

○ Female

2. How old are you?

[ ]

3. How many years of college have you completed?

[ ]

4. Are you a member of a fraternity or sorority?

○ Yes

○ No

5. Please check one of the following Ethnic categories:

○ Hispanic or Latino

○ Not Hispanic or Latino

6. Please check as many of the following racial categories that apply to you:

☐ American Indian or Alaska Native

☐ Asian

☐ Black or African American

☐ Native Hawaiian or Other Pacific Islander

☐ White

☐ None of the above apply to me

7. Where do you currently reside?

○ Off campus house or apartment
○ At home with parents/guardians
○ Fraternity or Sorority House
○ Campus Dormitory
○ Other

8. What is your marital status?

○ Single living alone
○ Single living with roommate(s)
○ Single living with partner
○ Married

9. What is your religious preference? (i.e. Baptist, Catholic, Islamic, None, Etc.)

[   ]

10. On how many of the past 28 days have you gambled?

Eysenck Impulsivity Questionnaire

Please answer each question by indicating yes or no. There are no right or wrong answers, and no trick questions. Work quickly and do not think too long about the exact meaning of the question.

1. Do you often buy things on impulse?

○ Yes   ○ No

2. Do you generally do and say things without stopping to think?

○ Yes   ○ No

3. Do you often get into a jam because you do things without thinking?

○ Yes   ○ No

4. Are you an impulsive person?

○ Yes   ○ No

5. Do you usually think carefully before doing anything?

○ Yes   ○ No

6. Do you often buy things on the spur of the moment?

○ Yes   ○ No

7. Do you mostly speak before thinking things out?

○ Yes   ○ No

8. Do you often get involved with things you later wish you could get out of?

○ Yes   ○ No

9. Do you ever get so carried away by new and exciting ideas that you never think of possible snags?

  ○ Yes   ○ No

10. Do you need to use a lot of self control to keep out of trouble?

  ○ Yes   ○ No

11. Would you agree that almost everything enjoyable is either illegal or immoral?

  ○ Yes   ○ No

12. Are you often surprised at peoples' reactions to what you do or say?

  ○ Yes   ○ No

13. Do you think an evening out is more successful if it is unplanned or arranged at the last minute?

  ○ Yes   ○ No

14. Do you usually work quickly without bothering to check?

  ○ Yes   ○ No

15. Do you often change your interests?

  ○ Yes   ○ No

16. Before making up your mind do you consider all the advantages and disadvantages?

  ○ Yes   ○ No

17. Do you prefer to sleep on it before making decisions?

  ○ Yes   ○ No

18. When people shout at you do you shout back?

◉ Yes   ○ No

19. Do you usually make up your mind quickly?

○ Yes   ◉ No

South Oaks Gambling Screen (SOGS)

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

Please check one answer for each statement	Not at all	Less than once a week	Once a week or more
a. Played cards for money			
b. Bet on horses, dogs, or other animals (at OTB, the track or with a bookie)			
c. Bet on sport (parlay cards, with bookie at Jai Alai)			
d. Played dice games, including craps, over and under or other dice games			
e. Went to casinos (legal or otherwise)			
f. Played the numbers or bet on lotteries			
g. Played bingo			
h. Played the stock and/or commodities market			
i. Played slot machines, poker machines, or other gambling machines			
j. Bowled, shot pool, played golf, or some other game of skill for money			
k. Played pull tabs or "paper" games other than lotteries			
l. Some form of gambling not listed above			

2.   What is the largest amount of money you have ever gambled with on any one-   day?
_____ Never gambled   _____ More than $100.00 up to $1,000.00
_____ $1.00 or less   _____ More than $1,000.00 up to$10,000.00
_____ More than $1.00 up to $10.00   _____ More than $10,000.000
_____ More than $10.00 up to $100.00

3.   Check which of the following people in your life has (or had) a gambling problem.
_____ Father   _____ Mother
_____ Brother/Sister   _____ My Spouse/Partner
_____ My Child(ren)   _____ Another Relative
_____ A Friend or someone important in my life

4.   When you gamble, how oftern do you go back another day to win back money   you have lost?
_____ Never   _____ Most of the time I lose
_____ Some of the time (< ½)   _____ Every time I lose

5.   Have you ever claimed to be winning money gambling, but weren't really? In   fact, you lost?
_____ Never   _____ Yes, less than ½ the time   _____ Yes, most of the time

6.   Do you feel you have a problem with betting or money gambling?

_____ No   _____ Yes   _____ Yes, in the past but not now

7.   Did you ever gamble more than you intended?   _____ Yes   _____ No

8.   Have people criticized your betting or told you that you   _____ Yes   _____ No
      had a problem, regardless of whether or not you thought
      it was true?

9.   Have you ever felt guilty about the way you gamble, or   _____ Yes   _____ No
      what happens when you gamble?

10.   Have you ever felt like you would like to stop betting   _____ Yes   _____ No
      money on gambling, but didn't think you could?

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

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

13.   (If yes to #12) Have money arguments ever centered on   _____ Yes   _____ No
       your gambling?

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

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

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

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

Multiple Choice Procedure (MCP10i)

For the following survey you will be presented with a series of hypothetical choices and asked to choose which one you would prefer. Imagine you are given a choice between money that you could use right away to gamble with in the game of your choice vs. money that could be used for anything other than gambling.

The choice on the left will always be a specific amount of money that may only be used to gamble with in your game of choice. For example, if your game of choice is poker, imagine that the money would be used right away in a poker game

The choice on the right will always be a guaranteed amount of money to be received at the time interval indicated. In other words, sometimes you will get the guaranteed money right away, and sometimes you will have to wait for it. Pay attention to the specific choices as the change from form to form At the point that you begin to choose the guaranteed money you will continue to choose that one for the rest of the time.

1. Would you rather have $10 to gamble in your game of choice or $0.00 immediately
2. Would you rather have $10 to gamble in your game of choice or $5.00 immediately
3. Would you rather have $10 to gamble in your game of choice or $10.00 immediately
4. Would you rather have $10 to gamble in your game of choice or $15.00 immediately
5. Would you rather have $10 to gamble in your game of choice or $20.00 immediately
6. Would you rather have $10 to gamble in your game of choice or $25.00 immediately
7. Would you rather have$10 to gamble in your game of choice   or $30.00 immediately
8. Would you rather have $10 to gamble in your game of choice or $35.00 immediately
9. Would you rather have $10 to gamble in your game of choice or $40.00 immediately
10. Would you rather have $10 to gamble in your game of choiceor $45.00 immediately
11. Would you rather have $10 to gamble in your game of choiceor $50.00 immediately
12. Would you rather have $10 to gamble in your game of choiceor $55.00 immediately
13. Would you rather have $10 to gamble in your game of choiceor $60.00 immediately
14. Would you rather have $10 to gamble in your game of choiceor $65.00 immediately
15. Would you rather have $10 to gamble in your game of choiceor $70.00 immediately
16. Would you rather have $10 to gamble in your game of choiceor $75.00 immediately
17. Would you rather have $10 to gamble in your game of choiceor $80.00 immediately
18. Would you rather have $10 to gamble in your game of choiceor $85.00 immediately
19. Would you rather have $10 to gamble in your game of choiceor $90.00 immediately
20. Would you rather have $10 to gamble in your game of choiceor $95.00 immediately
21. Would you rather have $10 to gamble in your game of choiceor $100.00 immediately
22. Would you rather have $10 to gamble in your game of choiceor $105.00 immediately
23. Would you rather have $10 to gamble in your game of choiceor $110.00 immediately
24. Would you rather have $10 to gamble in your game of choiceor $115.00 immediately
25. Would you rather have $10 to gamble in your game of choiceor $120.00 immediately
26. Would you rather have $10 to gamble in your game of choiceor $125.00 immediately
27. Would you rather have $10 to gamble in your game of choiceor $130.00 immediately
28. Would you rather have $10 to gamble in your game of choiceor $135.00 immediately
29. Would you rather have $10 to gamble in your game of choiceor $140.00 immediately
30. Would you rather have $10 to gamble in your game of choiceor $145.00 immediately
31. Would you rather have $10 to gamble in your game of choiceor $150.00 immediately

Multiple Choice Procedure (MCP10w)

For the following survey you will be presented with a series of hypothetical choices and asked to choose which one you would prefer. Imagine you are given a choice between money that you could use right away to gamble with in the game of your choice vs. money that could be used for anything other than gambling.

The choice on the left will always be a specific amount of money that may only be used to gamble with in your game of choice. For example, if your game of choice is poker, imagine that the money would be used right away in a poker game

The choice on the right will always be a guaranteed amount of money to be received at the time interval indicated. In other words, sometimes you will get the guaranteed money right away, and sometimes you will have to wait for it. Pay attention to the specific choices as the change from form to form At the point that you begin to choose the guaranteed money you will continue to choose that one for the rest of the time.

1. Would you rather have $10 to gamble in your game of choice or $0.00 in one week
2. Would you rather have $10 to gamble in your game of choice or $5.00 in one week
3. Would you rather have $10 to gamble in your game of choice or $10.00 in one week
4. Would you rather have $10 to gamble in your game of choice or $15.00 in one week
5. Would you rather have $10 to gamble in your game of choice or $20.00 in one week
6. Would you rather have $10 to gamble in your game of choice or $25.00 in one week
7. Would you rather have $10 to gamble in your game of choice or $30.00 in one week
8. Would you rather have $10 to gamble in your game of choice or $35.00 in one week
9. Would you rather have $10 to gamble in your game of choice or $40.00 in one week
10. Would you rather have $10 to gamble in your game of choiceor $45.00 in one week
11. Would you rather have $10 to gamble in your game of choiceor $50.00 in one week
12. Would you rather have $10 to gamble in your game of choiceor $55.00 in one week
13. Would you rather have $10 to gamble in your game of choiceor $60.00 in one week
14. Would you rather have $10 to gamble in your game of choiceor $65.00 in one week
15. Would you rather have $10 to gamble in your game of choiceor $70.00 in one week
16. Would you rather have $10 to gamble in your game of choiceor $75.00 in one week
17. Would you rather have $10 to gamble in your game of choiceor $80.00 in one week
18. Would you rather have $10 to gamble in your game of choiceor $85.00 in one week
19. Would you rather have $10 to gamble in your game of choiceor $90.00 in one week
20. Would you rather have $10 to gamble in your game of choiceor $95.00 in one week
21. Would you rather have $10 to gamble in your game of choiceor $100.00 in one week
22. Would you rather have $10 to gamble in your game of choiceor $105.00 in one week
23. Would you rather have $10 to gamble in your game of choiceor $110.00 in one week
24. Would you rather have $10 to gamble in your game of choiceor $115.00 in one week
25. Would you rather have $10 to gamble in your game of choiceor $120.00 in one week
26. Would you rather have $10 to gamble in your game of choiceor $125.00 in one week
27. Would you rather have $10 to gamble in your game of choiceor $130.00 in one week
28. Would you rather have $10 to gamble in your game of choiceor $135.00 in one week
29. Would you rather have $10 to gamble in your game of choiceor $140.00 in one week
30. Would you rather have $10 to gamble in your game of choiceor $145.00 in one week
31. Would you rather have $10 to gamble in your game of choiceor $150.00 in one week

Multiple Choice Procedure (MCP10m)

For the following survey you will be presented with a series of hypothetical choices and asked to choose which one you would prefer. Imagine you are given a choice between money that you could use right away to gamble with in the game of your choice vs. money that could be used for anything other than gambling.

The choice on the left will always be a specific amount of money that may only be used to gamble with in your game of choice. For example, if your game of choice is poker, imagine that the money would be used right away in a poker game

The choice on the right will always be a guaranteed amount of money to be received at the time interval indicated. In other words, sometimes you will get the guaranteed money right away, and sometimes you will have to wait for it. Pay attention to the specific choices as the change from form to form At the point that you begin to choose the guaranteed money you will continue to choose that one for the rest of the time.

1. Would you rather have$10 to gamble in your game of choice   or $0.00 in one month
2. Would you rather have $10 to gamble in your game of choice or $5.00 in one month
3. Would you rather have $10 to gamble in your game of choice or $10.00 in one month
4. Would you rather have $10 to gamble in your game of choice or $15.00 in one month
5. Would you rather have $10 to gamble in your game of choice or $20.00 in one month
6. Would you rather have $10 to gamble in your game of choice or $25.00 in one month
7. Would you rather have $10 to gamble in your game of choice or $30.00 in one month
8. Would you rather have $10 to gamble in your game of choice or $35.00 in one month
9. Would you rather have $10 to gamble in your game of choice or $40.00 in one month
10. Would you rather have $10 to gamble in your game of choiceor $45.00 in one month
11. Would you rather have $10 to gamble in your game of choiceor $50.00 in one month
12. Would you rather have $10 to gamble in your game of choiceor $55.00 in one month
13. Would you rather have $10 to gamble in your game of choiceor $60.00 in one month
14. Would you rather have $10 to gamble in your game of choiceor $65.00 in one month
15. Would you rather have $10 to gamble in your game of choiceor $70.00 in one month
16. Would you rather have $10 to gamble in your game of choiceor $75.00 in one month
17. Would you rather have $10 to gamble in your game of choiceor $80.00 in one month
18. Would you rather have $10 to gamble in your game of choiceor $85.00 in one month
19. Would you rather have $10 to gamble in your game of choiceor $90.00 in one month
20. Would you rather have $10 to gamble in your game of choiceor $95.00 in one month
21. Would you rather have $10 to gamble in your game of choiceor $100.00 in one month
22. Would you rather have $10 to gamble in your game of choiceor $105.00 in one month
23. Would you rather have $10 to gamble in your game of choiceor $110.00 in one month
24. Would you rather have $10 to gamble in your game of choiceor $115.00 in one month
25. Would you rather have $10 to gamble in your game of choiceor $120.00 in one month
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Multiple Choice Procedure (MCP25i)

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Multiple Choice Procedure (MCP25w)

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4. Would you rather have $25 to gamble in your game of choice or $15.00 in one week
5. Would you rather have $25 to gamble in your game of choice or $20.00 in one week
6. Would you rather have $25 to gamble in your game of choice or $25.00 in one week
7. Would you rather have $25 to gamble in your game of choice or $30.00 in one week
8. Would you rather have $25 to gamble in your game of choice or $35.00 in one week
9. Would you rather have $25 to gamble in your game of choice or $40.00 in one week
10. Would you rather have $25 to gamble in your game of choiceor $45.00 in one week
11. Would you rather have $25 to gamble in your game of choiceor $50.00 in one week
12. Would you rather have $25 to gamble in your game of choiceor $55.00 in one week
13. Would you rather have $25 to gamble in your game of choiceor $60.00 in one week
14. Would you rather have $25 to gamble in your game of choiceor $65.00 in one week
15. Would you rather have $25 to gamble in your game of choiceor $70.00 in one week
16. Would you rather have $25 to gamble in your game of choiceor $75.00 in one week
17. Would you rather have $25 to gamble in your game of choiceor $80.00 in one week
18. Would you rather have $25 to gamble in your game of choiceor $85.00 in one week
19. Would you rather have $25 to gamble in your game of choiceor $90.00 in one week
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23. Would you rather have $25 to gamble in your game of choiceor $110.00 in one week
24. Would you rather have $25 to gamble in your game of choiceor $115.00 in one week
25. Would you rather have $25 to gamble in your game of choiceor $120.00 in one week
26. Would you rather have $25 to gamble in your game of choiceor $125.00 in one week
27. Would you rather have $25 to gamble in your game of choiceor $130.00 in one week
28. Would you rather have $25 to gamble in your game of choiceor $135.00 in one week
29. Would you rather have $25 to gamble in your game of choiceor $140.00 in one week
30. Would you rather have $25 to gamble in your game of choiceor $145.00 in one week
31. Would you rather have $25 to gamble in your game of choiceor $150.00 in one week

Multiple Choice Procedure (MCP25m)

For the following survey you will be presented with a series of hypothetical choices and asked to choose which one you would prefer. Imagine you are given a choice between money that you could use right away to gamble with in the game of your choice vs. money that could be used for anything other than gambling.

The choice on the left will always be a specific amount of money that may only be used to gamble with in your game of choice. For example, if your game of choice is poker, imagine that the money would be used right away in a poker game

The choice on the right will always be a guaranteed amount of money to be received at the time interval indicated. In other words, sometimes you will get the guaranteed money right away, and sometimes you will have to wait for it. Pay attention to the specific choices as the change from form to form At the point that you begin to choose the guaranteed money you will continue to choose that one for the rest of the time.

1. Would you rather have $25 to gamble in your game of choice or $0.00 in one month
2. Would you rather have $25 to gamble in your game of choice or $5.00 in one month
3. Would you rather have $25 to gamble in your game of choice or $10.00 in one month
4. Would you rather have $25 to gamble in your game of choice or $15.00 in one month
5. Would you rather have $25 to gamble in your game of choice or $20.00 in one month
6. Would you rather have $25 to gamble in your game of choice or $25.00 in one month
7. Would you rather have $25 to gamble in your game of choice or $30.00 in one month
8. Would you rather have $25 to gamble in your game of choice or $35.00 in one month
9. Would you rather have $25 to gamble in your game of choice or $40.00 in one month
10. Would you rather have $25 to gamble in your game of choiceor $45.00 in one month
11. Would you rather have $25 to gamble in your game of choiceor $50.00 in one month
12. Would you rather have $25 to gamble in your game of choiceor $55.00 in one month
13. Would you rather have $25 to gamble in your game of choiceor $60.00 in one month
14. Would you rather have $25 to gamble in your game of choiceor $65.00 in one month
15. Would you rather have $25 to gamble in your game of choiceor $70.00 in one month
16. Would you rather have $25 to gamble in your game of choiceor $75.00 in one month
17. Would you rather have $25 to gamble in your game of choiceor $80.00 in one month
18. Would you rather have $25 to gamble in your game of choiceor $85.00 in one month
19. Would you rather have $25 to gamble in your game of choiceor $90.00 in one month
20. Would you rather have $25 to gamble in your game of choiceor $95.00 in one month
21. Would you rather have $25 to gamble in your game of choiceor $100.00 in one month
22. Would you rather have $25 to gamble in your game of choiceor $105.00 in one month
23. Would you rather have $25 to gamble in your game of choiceor $110.00 in one month
24. Would you rather have $25 to gamble in your game of choiceor $115.00 in one month
25. Would you rather have $25 to gamble in your game of choiceor $120.00 in one month
26. Would you rather have $25 to gamble in your game of choiceor $125.00 in one month
27. Would you rather have $25 to gamble in your game of choiceor $130.00 in one month
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30. Would you rather have $25 to gamble in your game of choiceor $145.00 in one month
31. Would you rather have $25 to gamble in your game of choiceor $150.00 in one month