

## The Role of Impulsivity, Cognitive Bias, and Reasoned Action in Understanding College Student Gambling

Su Hyun Shin, The Ohio State University<sup>1</sup>  
Catherine P. Montalto, The Ohio State University<sup>2</sup>

### Abstract

Factors related to gambling behavior among college students in the United States are examined by applying the Theory of Reasoned Action (TRA) and incorporating the concepts of impulsivity and cognitive bias. A majority of the respondents (84.4%) in this study report that they did not gamble in the last 30 days. Gambling is modeled as economic behavior where rational individuals are hypothesized to gamble in order to maximize their utility subject to constraints. Building on recent studies confirming correlation between gambling, financial management, and financial behavior, this study uses a broader approach to analyze gambling behavior by including financial behavior variables. The results of the OLS regression analysis indicate that gambling frequency is strongly related to attitudes toward gambling and cognitive bias toward gambling and weakly associated with subjective norms of family members regarding financial behavior and underestimation of financial behavior. The results of the Logistic regression analysis suggest that gambling propensity is strongly related to attitudes toward gambling, subjective norms of family members regarding financial behavior, and cognitive bias toward gambling. The empirical work finds only weak evidence that impulsivity is associated with gambling propensity.

Key words: Gambling, College Students, Impulsivity, Cognitive Bias, Reasoned Action, Financial Behavior

### Introduction

Most research on gambling was published in the 1990s and the primary focus was on issues related to problem or pathological gambling. Theories from various disciplines were employed as frameworks for investigating pathological gambling, including Jacobs' General Theory of Addiction (Gupta and Derevensky, 1998b), social learning theory (Brown, 1988), cognitive-behavioral theory (Sharpe & Tarrier, 1993), and comprehensive models combining biological, sociological, cognitive, and developmental determinants (Blaszczynski & Nower, 2002; Sharpe, 2002). The theories consistently emphasize race, gender, family, and demographic factors as important factors associated with pathological gambling. These approaches explain pathological gambling behavior by highlighting underlying demographic and personality traits associated with gambling.

Fewer studies have focused on non-pathological gambling, albeit the fact that the majority of people who engage in gambling are not pathological gamblers. Less than 4.6% of adults who gamble are classified as pathological or probable pathological gamblers while the estimates for youth range from 1.7% to 8.5% (McGowan, Droessler, Nixon, & Grimshaw, 2000). Cummings and Corney (1987) introduced the Theory of Reasoned Action (TRA) developed by Ajzen and Fishbein (1980) in order to predict the intention to gamble. Empirically, Moore and Ohtsuka (1997) tested the TRA combined with personality and cognitive bias variables on a sample of Australian youth. This study will follow Moore and Ohtsuka's (1997) model to conceptualize non-pathological gambling. Gambling is modeled as economic behavior where rational individuals are hypothesized to gamble in order to maximize their utility subject to constraints (Friedman & Savage, 1948; Becker & Murphy, 1988). Also, recent studies indicate that gambling is related to financial management and financial behavior (Worthy, Jonkman, & Blinn, 2010; Chen, Dowling, & Yap, 2012; Li, 2012). Thus, this study will use a broader approach to analyze gambling behavior by including financial behavior variables.

Gambling behavior of college students is our focus because college students are at higher risk of gambling due to their myopic behavior and higher discount rates compared to older adults. This study will examine gambling behavior among college students based on a framework of the TRA incorporating the concepts of impulsivity and cognitive bias.

<sup>1</sup> Ph.D. Student, Department of Consumer Sciences, 1787 Neil Avenue, Room 231 Columbus, OH 43210-1295, [shin.375@osu.edu](mailto:shin.375@osu.edu)

<sup>2</sup> Associate Professor, Department of Consumer Sciences, 1787 Neil Avenue, Room 115F, Columbus, OH 43210-1295, [montalto.2@osu.edu](mailto:montalto.2@osu.edu)

## Literature Review

Numerous studies related to gambling have been conducted by researchers from diverse disciplines. This section reviews the literature on pathological gambling, gambling as economic behavior, and gambling among college students.

### Pathological Gambling

Most gambling literature focuses on pathological gambling defined as a disorder of impulse control (A.P.A., 1980). Gamblers are defined as being pathological when they show behaviors similar to addicts of other substances (Lesieur & Rosenthal, 1991). Common characteristics of pathological gamblers include preoccupation with gambling or gaining money from gambling, betting more money in order to obtain the desired level of excitement (tolerance), restlessness or irritability when gamblers stop gambling (withdrawal), gambling repeatedly to win money back they lost (chasing), gambling as a means of escaping their problems, lying to hide their engagement in gambling, illegal activities to finance gambling, losing their relationships due to gambling, and borrowing money for gambling (A.P.A., 1980). If gamblers show four or more behaviors listed above, they are diagnosed as pathological gamblers, regardless of gambling frequency.

By treating gambling as a disorder, Gupta and Derevensky (1998b) explained adolescents' gambling as addiction using Jacobs' (1986) General Theory of Addiction. Jacobs' (1986) General Theory of Addiction assumes that pathological gamblers are characterized by two predisposing conditions – an abnormal physiological resting state and a sense of inadequacy caused by childhood experiences. Related to the two predisposing conditions, Gupta and Derevensky (1998b) hypothesized that pathological gamblers are more likely to show abnormal physiological resting states, have lower self-esteem, be more depressed and insecure, perceive their childhood as unhappy, dissociate while gambling, and use gambling as a way of escaping their problems, and depression. With a sample of 817 adolescents, they found evidence that pathological gamblers have higher levels of abnormal physiological resting states, emotional distress and dissociation, and engage more in other addictive behaviors, supporting Jacobs' General Theory of Addictions.

In contrast to viewing gambling as a disease, gambling has also been explained with social learning theory (Brown, 1988). Social learning theory suggests that people start gambling by learning from others, especially their peers. Based on the theory, gambling frequency is influenced by social contexts, whether gambling opportunities are available, access to gambling facilities, the leisure habits of individuals and their peers, and how individuals use their money. Ocean and Smith (1993) emphasized the importance of gambling institutions and the outside society around gamblers. The major findings are that social rewards in gambling institutions reinforce gamblers to be committed to the institutions as evidenced by emotional and moral support, an increased self-esteem, a new defined social status separate from the outside world, a salient identity as a gambler, and a group affiliation. Also, gamblers are more likely to engage in gambling in the institutions in order to reduce negative reinforcements including conflicts with outside society including loss of social networks, value conflicts, and dissonance with the outside culture. Social learning theory emphasizes environmental factors and society, and significant others surrounding people in order to explain individuals' gambling behavior.

Another approach to gambling is established by cognitive-behavioral theory (Sharpe & Tarrier, 1993). Cognitive-behavioral theory frames gambling as being learned through operant and classical conditioning reinforced by monetary gains and autonomic arousal expressing excitement. These factors are assumed to be related to cognition such as beliefs in their skill for gambling and a perceived probability of winning or losing. The major difference of this approach from others is that the theory views the probability of gambling as mediated by coping skills such as control over autonomic arousal, abilities to challenge biased cognitions, problem-solving skills, and ability to delay reinforcement. Additionally, poor coping skills are determined by predisposing factors such as low self-esteem, alcohol consumption, financial problems, stress, and social pressures. Cognitive-behavioral theory is distinctive in that it suggests that pathological gambling can be controlled by gamblers' coping skills.

Combining biological, psychological, and social factors together, some studies posited comprehensive models to examine determinants of pathological gambling (Blaszczynski & Nower, 2002; Sharpe, 2002). Comprehensive models might be advantageous in identifying as many factors as possible that determine pathological gambling, but they have less explanatory power with respect to non-pathological gambling. Also, having more variables in the model does not guarantee the model's validity and usability. The fact that no empirical studies have used the comprehensive models may be symptomatic of difficulties in empirically testing the model. Since the purpose of this study is

to determine factors associated with non-pathological gambling, a different approach to view gambling is needed. This study will assume gambling as rational behavior that is associated with individuals' financial behavior based on literature from economics.

### **Gambling as Economic Behavior**

According to earlier studies in economics, gambling can be conceptualized as rational economic behavior (Friedman & Savage, 1948; Becker & Murphy, 1988). The main assumption of the Friedman-Savage gambling model is that a utility function defined on wealth is not concave in contrast to the traditional economic model assuming diminishing marginal utility. Instead, the utility function has two convex areas corresponding to a low and a high socioeconomic level respectively connected by a concave area. The shape of the utility curve suggests that if one's relative socioeconomic position is lifted within their own class due to an increase of income this would result in diminishing marginal utility, while if their position is shifted to an upper class this would induce increasing marginal utility. In this sense, if individuals are eager to accumulate their wealth and move up to an upper socioeconomic class, they are more likely to take advantage of gambling such as the purchase of lottery tickets as a means of achieving their goal. Brunk (1981) empirically tested the model by regressing dissatisfaction with current income and control variables on yearly expenditure on lotteries, and concluded that if individuals are dissatisfied with their current income level, they spend more money on lottery gambles. Although the Friedman-Savage gambling model may not be applicable to gambling undertaken for socialization and entertainment such as bingo, poker, and football pools, the model is valuable in a sense of considering gambling as economic behavior.

Becker and Murphy (1988) suggested that additive behavior including gambling can be explained by a framework of rationality in which individuals maximize their utility over time. In order to be defined as being additive, current consumption should be positively influenced by past consumption. Mobilia (1993) analyzed demand for gambling at horse racing tracks by using the Becker-Murphy model with data collected from the American Racing Manual for the period from 1950 to 1987, and presented evidence that past or future consumption positively influenced current consumption of gambling. Also, consistent with the Becker-Murphy model, the price elasticity of demand for gambling has a negative value,  $-.68$ , indicating that current consumption is negatively related to the price of gambling. The Becker-Murphy model is not so different from the traditional economic idea that individuals maximize their utility subject to their budget constraints, and there is a negative relationship between the price of gambling and its consumption.

Chen et al. (2012) assumed that gambling might be similar to other financial behaviors, and that like other financial behaviors, gambling might be influenced by financial management, attitudes toward financial management, and money. Worthy et al. (2010) did not specifically define gambling as one of the problematic financial behaviors among college students, but assumed that pathological gambling and financial behaviors are related to each other. They concluded that students with higher sensation-seeking personalities and with higher pathological gambling characteristics are more likely to behave poorly in financial management. Worthy et al.'s conclusion is consistent with Chen et al.'s suggestion that gambling and financial behavior might be concepts that should be considered together.

Li (2012) revealed that gamblers behave as financial activists under rationality by analyzing the Consumer Expenditure Survey collected by the Bureau of Labor Statistics. He assumed that some consumers would substitute state lotteries for charities if state lotteries could be perceived as a way of donating money for public services. Even after controlling for household permanent income, demographic variables, and the year, Li found that gamblers are more likely to make donations compared to non-gamblers. This indicates that some gamblers make a rational choice to gamble for a contribution to the society as well as for their own enjoyment as economic behavior. Also, gamblers tend to participate actively in financial markets. Gamblers are more likely to have various types of debt as well as diversified assets including stocks and a second home. This information suggests that gambling is related to individual financial behavior and further it might be directly regarded as financial behavior. Thus, although most literature has focused on problematic or pathological gambling behavior, gambling should not be treated as only irrational behavior. Instead, since non-pathological gamblers make their choice under rationality, gambling might be studied as one type of economic behavior that can be related to other financial behavior such as tracking transactions and paying bills on time.

### **College Student Gambling**

College students are more likely to be risk-taking because they have higher discount rates and are more present-oriented compared to those who are older, which makes them susceptible to

risky behavior including gambling. For this reason, exploring gambling behavior among college students would be interesting due to their distinctive characteristics in terms of risk perception.

First, there is literature documenting the general prevalence and perception of gambling among college students. Hira and Monson (2000) showed that 56% of 797 undergraduate students gambled, with lottery and non-casino card games reported as the two most common types of gambling in 1996. Wickwire, Whelan, West, Meyers, McCausland, and Leullen (2007) focused on how college students perceive availability, related risks, and benefits of gambling. They found that college students tend to perceive gambling as more available than alcohol and marijuana and less risky than alcohol and cigarettes. College students also considered socialization, financial gain, and positive changes in mood as perceived benefits of gambling.

Second, some studies investigate risk factors associated with pathological gambling. The multiple regression analysis with South Oaks Gambling Screen(SOGS) measuring the level of pathological or problem gambling clarified that being male, using more illicit drugs, overeating, having parents with gambling problems, having experiences of arrest for non-traffic offense, frequent heavy drinking, being nonwhite, being older, living with parents, being Asian, receiving more parking tickets, and being non-Protestant significantly predict variances in SOGS scores (Lesieur, Cross, Frank, Welch, White, Rubenstein, Moseley, & Mark, 1991). In addition, Winters, Bengston, Dorr, and Stinchfield (1998) concluded that being male, having parents with pathological gambling, using illicit drugs regularly, and having poor grades are significantly strong factors of pathological gamblers. Similarly, being male, being non-white, and using alcohol, illicit drug, and tobacco are considered as the most risky factors associated with problem gambling (Stinchfield, Hanson, & Olson, 2006).

Lastly, gambling studies for college students have focused on exploring variables that influence non-pathological gambling. LaBrie, Shaffer, LaPlante and Wechsler (2003) determined various factors related to college student gambling. Among demographic variables, being male, being older than 20 years, having parents with no college degree, and living in the states where gambling is more available were strong predictors of the odds of gambling. Students who have less productive lifestyles as indicated by lower GPA, spending more time watching TV and less time on studying, and being online without academic purpose are more likely to gamble. Also, substance use is related to gambling, indicating that consumption of illicit drugs and drinking alcohol are associated with the odds of gambling. Fraternity or sorority membership and the propensity to party are also identified as risk factors of gambling. Moreover, regular gambling is predicted by perceived availability, perceived risk, and perceived benefits of gambling among college students (Wickwire et al., 2007). Browne and Brown (1994) reported gambling depends on parental gambling, peer gambling, types of games, gender, and locus of control.

### Theoretical Framework

The Theory of Reasoned Action (TRA) provides the framework for determining factors that influence college students' gambling behavior, combined with personality variables (impulsivity), and cognitive bias variables following Moore and Ohtsuka (1997). According to Ajzen and Fishbein (1972), an individual's intention to engage in a given behavior is predicted by his or her attitude toward the behavior and his or her beliefs about what significant others expect him or her to do. The later factor is called 'subjective norm' by Ajzen and Fishbein (1980)'s theory of reasoned action. Attitudes are determined by the summation of beliefs about the behavior multiplied by subjective evaluation of the belief's attributes while subjective norms are a function of normative beliefs regarding whether significant others approve or disapprove of the behavior in question, together with the individual's motivation to comply with these perceived norms.

The utilization of the TRA as a conceptual model for gambling behavior was first presented in Cummings and Corney (1987)'s study, albeit they did not conduct empirical studies to verify the theory. They suggested individual's intention to gamble is predicted by attitudes toward gambling and subjective norms with respect to gambling. Additionally, they proposed other variables that are associated with gambling such as demographics, socioeconomics, personality and motivation. These variables are considered to have only indirect effects on behavior rather than direct effects.

Based on the theory of reasoned action and incorporating personality variables (venturesomeness, impulsiveness) and cognitive bias variables (Weinstein, 1980), Moore and Ohtsuka (1997) used hierarchical regression analyses to predict gambling intention, gambling frequency, and problem gambling respectively separately for boys and girls with a sample of 1,071 Australian adolescents and college students. Gambling intention is the strongest predictor of gambling frequency and problem gambling for both boys and girls. Interestingly, they found that attitude toward gambling is a significant predictor of intention to gamble and gambling frequency but not problem gambling,

while subjective norms significantly predicted both the intention to gamble and problem gambling but not gambling frequency. The TRA is supported for predicting intention to gamble with R-square statistics of 13.3% for boys and 15.2% for girls respectively. By adding personality variables and cognitive bias variables into the TRA models, the power to explain variations of the means of intention to gamble, gambling frequency, and problem gambling are significantly increased, in spite of small marginal changes in estimated coefficients. In this section, each of the variables for predicting gambling will be specified, and the model for this study will be outlined, followed by the corresponding hypotheses.

**Attitudes toward gambling.** The positive association between attitudes toward gambling and engagement in pathological gambling (Moore and Ohtsuka, 1997; Jacobs, 2000; Chiu and Storm, 2010) and non-pathological gambling (Moore and Ohtsuka, 1997; Breen & Zuckerman, 1999; Delfabbro & Thrupp, 2003; Wood & Griffiths, 2004; Jackson, Dowling, Thomas, Bond, & Patton, 2008) is documented in the previous research.

Among the studies that document association between pathological gambling and attitudes toward gambling, Jacobs (2000) tracked trends of juvenile gambling in North America from 1984 to 1999 based on findings from twenty independent studies. He clarified that groups with serious gambling-related problems have more positive attitudes toward gambling than groups without gambling-related problems. Moreover, Chiu and Storm (2010) not only examined the association between different variables potentially related to gambling and level of gambling but also verified factors predicting gambling severity and gambling membership by using a multiple regression analysis and a discriminant analysis. They used the Gambling Attitude Scales (GAS) developed by Kassinove (1998) as a measurement of attitudes toward gambling. The results confirm that individuals who are categorized in the problem gambling group scored higher in the GAS compared to those who are categorized in other gambling groups. Additionally, they reported that GAS variables are one of the significant predictors of gambling severity.

Breen and Zuckerman (1999) identified the association between personality and cognitive variables such as impulsivity, sensation seeking, and attitudes toward gambling with chasing behavior in gambling by conducting an experiment that engaged participants in computer-generated gambling with real money. Attitudes toward gambling were measured with the Gambling Attitude and Belief Survey (GABS) instrument. The result indicated that those who decided not to gamble scored significantly lower on GABS than those who chose to gamble. Also, a positive association was found between attitudes toward gambling and adolescents' intention to gamble (Delfabbro & Thrupp; 2003), reported playing of lotteries and scratchcards (Wood and Griffiths; 2004), and gambling in the previous year (Jackson et al.; 2008). Based on the results from the previous studies, the following hypothesis will be tested.

H1: College students with positive gambling attitudes will gamble more.

**Subjective norms.** Most literature on adolescent gambling has emphasized parental gambling as one of the variables correlated with adolescent problem gambling (Lesieur & Rothschild, 1989; Gambino, Fitzgerald, Shaffer, Renner, & Courtnage, 1993; Winsters et al., 1993; Govoni, Rupcich, Frisch, 1996; Gupta & Derenvensky; 1998a). Specifically, since these studies indicated that pathological gamblers are more likely to have parents with gambling problems, they are more interested in the correlation between parents' problem gambling and adolescents' pathological gambling. They suggested that a family history of pathological gambling is one of the most influential risk factors for children's problem gambling.

In addition, parental non-pathological gambling is also related to adolescents' gambling. Wood and Griffiths (2004) used parental non-pathological gambling as a proxy of subjective norms with respect to gambling, applying the theory of planned behavior (Ajzen, 1991) in order to explain adolescents' gambling in the National Lottery with scratchcards. Their usage of the theory was rather limited in that they conducted only a correlation analysis between three explanatory variables – attitudes toward gambling, subjective norms, and perceive behavioral control over gambling – and children's gambling. In spite of the limitation, they found a positive correlation between parental and child gambling for the lottery and scratchcards.

Moreover, parental gambling as well as parental attitudes toward gambling influences their children's gambling. Fisher (1999) emphasized impacts of parental gambling behavior and attitudes toward gambling on problem gambling among British adolescents. First, she showed a positive association between parents' problem gambling and their children's problem gambling. Specifically, the children who are problem gamblers are three times more likely to perceive that their parents gamble too much compared to other children. Additionally, parental attitudes toward child gambling

are also associated with children's problem gambling. For example, 55% of the children who are problem gamblers reported that their parents approved, or did not mind, while only 34% of the children who are not problem gamblers reported that their parents approved of the National Lottery Draw. Parental gambling behavior and parents' attitudes toward children's gambling increased the odds of child problem gambling by 110% and 54% respectively. These results provide evidence that parental approval for children's gambling is a significant predictor of their gambling, which is consistent with the theory of reasoned action.

Also, gambling can be influenced by not only parents' but also other family members' and friends' gambling and attitudes (Hira & Monson, 2000; Jacobs, 2000; Delfabbro & Thrupp, 2003). Jacobs' (2000) study indicated that groups with serious gambling-related problems are more likely to have parents, relatives or close friends who gamble. Hira and Monson (2000) also identified a positive relationship between gambling expenditure of parents and peers and students' gambling frequency, expenditure, and scope (level). Delfabbro and Thrupp (2003) paid attention to attitudes toward gambling of family members and friends as well as their gambling behavior, which are associated with adolescents' gambling. Their results confirm that adolescents' gambling frequency is positively associated with the approval of their family and friends. Moreover, perceived gambling frequency of their family and friends was correlated with their own gambling frequency.

On the other hand, parents' advice about financial management and economic concepts might be considered as an indirect factor that determines gambling. Furham (1986) emphasized that parents' teaching has a great impact on children's understanding of economic concepts and use of money, and mentioned in conclusion that gambling might be one of the resulting uses of money, which is suggested as an opportunity for future research. Although Furham (1986) only suggests that gambling can be understood in the same way as other financial behaviors, Chen et al. (2012) hypothesized that gambling behavior might be related to financial management, attitudes toward financial management and money. Chen et al. revealed that problem gambling severity has a positive association with attitudes toward financial management and obsession, and has a negative association with budgeting, despite the fact that gambling frequency is not significantly associated with any of these variables. This study suggested a new perspective that gambling might be related to variables associated with financial behavior. From the new perspective, gambling can be defined as behavior related to financial management, and it might be explained by significant others' advice about financial management. Thus, subjective norms of significant others with regard to financial behavior can possibly predict gambling behavior. Accordingly, the following hypotheses are established.

H2: College students who comply more with family members' financial advice will gamble less.

H3: College students who comply more with friends' financial advice will gamble less.

**Impulsivity.** Most previous gambling studies have revealed a relationship between individuals' level of impulsivity and pathological gambling (Steel & Blaszczynski, 1996; Blaszczynski, Steel, & McConaghy, 1997; Langewisch & Frisch, 1998; Vitaro, Ferland, Jacques, & Ladouceur, 1998; Vitaro, Arseneault, Tremblay, 1999). The pathological gamblers are found to be distinguished by a high level of impulsivity and antisocial personality (Steel & Blaszczynski, 1996; Blaszczynski et al., 1997). In later research, Steel and Blaszczynski (1998) extended their study to demonstrate that pathological gamblers are characterized by not only high level of impulsivity and anti-social personality but also other personality disorders. Vitaro et al. (1998) supported this result by demonstrating that problem gamblers are more likely to be problem substance users and be more impulsive. Vitaro et al. (1999) also manifested results consistent with previous studies, indicating that problem gambling is predicted by self-reported impulsivity and a card-sorting task among low SES adolescent males. Langewisch and Frisch (1998) considered gambling as a risky behavior that is influenced by sensation seeking and impulsivity. They confirmed that pathological gamblers among male college students score higher in sensation seeking, impulsivity, and other risky behaviors than non-pathological gamblers.

Although previous research confirms that impulsivity significantly predicts pathological gambling or problem gambling, there is not much evidence that the same relationship holds between impulsivity and non-pathological gambling. Moore and Ohtsuka (1997) tested if impulsivity would determine both problematic gambling and gambling frequency, and showed that impulsivity predicts problem gambling for both boys and girls, while predicting gambling frequency only for girls. This suggests a possibility that non-pathological gambling can be predicted by individuals' level of impulsivity, albeit the relationship might be weak. Thus, the following hypothesis will be tested in this study.

H4: College students with a higher level of impulsivity will gamble more.

**Cognitive bias.** Cognitive bias toward gambling has been explained in various ways. Langer (1975) introduced a concept of illusion of control which is defined as “an expectancy of a personal success probability inappropriately higher than the objective probability would warrant.” The illusion of control can strengthen individuals’ confidence through factors related to gambling such as competition, choice, familiarity, and involvement. To be specific, individuals feel more confident when they gamble against inexperienced competitors, when they can choose their own tickets for lottery, when they are familiar with a specific machine in a casino, and lastly when they can throw a dice in a game.

Ladouceur, Gaboury, Dumont, and Rochette (1988) pointed out an illusory perception of control could be strengthened by a few wins. They conducted an experiment with twenty Canadian subjects, and the subjects were randomly assigned to two groups – frequent versus infrequent wins. The results confirm that the subjects in both groups verbalized their wins irrationally, rather than expressing them rationally. Also, they perceived that their wins were attributable to personal factors including their skill to gamble while their losses were caused by external factors such as bad luck. Sharpe and Tarrier (1993) claimed that if gamblers had wins, they reinforced erroneous beliefs about their probability of winning, and when they lost they believed that a win might be just around the corner; this is referred to as the gambler’s fallacy. They predicted that those who have gambler’s fallacy will be more likely to show the behavior of chasing where people take more risk to recover their previous losses.

Gilovich (1983) tried to explain the reason that people continued gambling in spite of continued losses with distorted evaluation of outcomes. He confirmed existence of gamblers’ distorted evaluation by demonstrating that gamblers tend to spend much more time describing their losses than their wins, and to discount their losses and to loom their wins bigger. Also, he reported that gamblers show a tendency to interpret their losses as ‘near wins.’ This result is consistent with Sharpe and Tarrier (1993)’s gambler’s fallacy.

Griffiths (1990) summarized the cognitive factors of gambling as illusion of control, cognitive regret such as a near miss, and biased evaluation of outcomes by displaying that pathological gamblers believe that they have a greater skill than regular gamblers, losses are more explainable by external factors, and gamblers have more incentive to persist gambling when they win or nearly win.

Moore and Ohtsuka (1997) applied Weinstein (1980)’s theories of unrealistic optimism to explain young gamblers’ behavior. They classified cognitive bias related to gambling into perceived undesirability, perceived frequency of the event, perceived control over the event, knowledge of, and stereotyping of a person who had experience with the event by using Weinstein (1980)’s framework. The perceived undesirability of gambling means that gamblers underestimate their chance of losing while overestimate their probability of winning. Perceived frequency of the event indicates that gamblers tend to perceive their chance of winning is greater than others. If they believe they have skill that influences outcomes of gambling, they consider their chance of winning to be higher, and this falls into perceived control over the event. Also, if gamblers know a person who has experienced a great loss or a big win, this would influence their belief about their outcomes. Lastly, if they perceive that certain types of people win at gambling, this stereotype would impact their perception of the probability of winning. Moore and Ohtsuka (1997) improved the ability to explain the variation of gambling frequency by four to six percent by including these variables related to cognitive bias toward gambling.

In addition, if we accept the fact that gambling is related to diverse financial behaviors, cognitive bias would not be limited to only gambling situations. Further, if people have inconsistency between perceptions of their financial management and actual practices of their financial behavior, it might also be possible to predict their gambling behavior, even though the relationship has not been documented in the previous literature. Overestimating actual practices compared to perceived practices might have a positive relationship with gambling while underestimating actual practices compared to perceived practices might be negatively related to gambling. By consolidating the two perspectives of cognitive bias, our hypotheses are formulated.

H5: College students who have cognitive bias toward gambling will gamble more.

H6A: College students who overestimate their financial behavior will gamble more.

H6B: College students who underestimate their financial behavior will gamble less.

Based on the hypotheses, the model for current study is shown in Figure 1.



Figure 1. The Model for Gambling

**Method**

**Data**

This study used the Student Financial Wellness Survey implemented by the Office for the Study of Student Life and the Student Wellness Center at a large Midwestern university in the fall of 2010. The data includes rich information about spending habits, attitudes and financial practices of students. Over 5,700 students from 19 colleges and universities in the state participated in the survey. After filtering out all missing cases, 5,039 responses are used for analyses.

**Analysis**

To test the research hypotheses, gambling frequency and a dichotomous indicator of gambling are selected as dependent variables. Independent variables include attitudes toward gambling, subjective norms of family members with regard to financial behavior, subjective norms of friends with regard to financial behavior, impulsivity, cognitive bias toward gambling, and cognitive bias toward financial behavior. Gender, race/ethnicity, rank, employment status, and GPA are chosen as control variables. First, mean differences of gambling frequency between all categories of the independent variables are analyzed by using ANOVA in order to identify variation in gambling frequency. Ordinary Least Squares regression analysis is used to model college students' gambling frequency as a function of the independent and control variables. Logistic regression is used to model the probability of gambling as a function of the same independent and control variables. The results of the OLS and logistic regressions will be compared to explore whether common factors are related to gambling frequency and the propensity to gamble.

**Dependent Variable**

**Gambling Frequency.** For the dependent variable, this study used the question “how often have you spent money on in-person gambling (lottery, cards, sports, etc) in the last 30 days?” The survey responses are categorical, including the options ‘none’, ‘once’, ‘twice’, ‘3-5 times’, ‘6-10 times’, and ‘more than 10 times’. The categorical variable was transformed into a continuous variable by coding none as zero, once as one, twice as two, 3-5 times as 4, 6-10 times as 8, and more than 10 times as 15. Only 25 participants responded they gambled more than 10 times in the last 30 days.



**Gambler.** By using the same measurement for gambling frequency, respondents who reported they had not spent money on in person gambling in the last 30 days are categorized as non-gamblers (indicator variable equal to 0), otherwise as gamblers (indicator variable equal to 1).

### Independent Variables

**Attitudes toward gambling.** Survey participants responded to the prompt “I like to gamble” by selecting from the responses: ‘strongly disagree’, ‘disagree’, ‘agree’, ‘strongly agree’. The attitude toward gambling variable is coded as 1 when agree or strongly agree is chosen indicating a positive attitude toward gambling; otherwise the variable is coded as 0.

**Subjective norms of family members with regard to financial behavior.** The survey item “I rely on family members for financial advice” is used as a proxy of subjective norms of family members with respect to financial behavior. The indicator variable is coded as 1 when agree or strongly agree is chosen indicating high compliance with family members’ subjective norms; otherwise the variable is coded as 0.

**Subjective norms of friends with regard to financial behavior.** The survey item “I rely on friends for financial advice” is used as a proxy for subjective norms of friends for financial management. The indicator variable is coded as 1 when agree or strongly agree is chosen indicating high compliance with friends; otherwise the variable is coded as 0.

**Impulsivity.** The survey item “In the past three months, I purchased something expensive that I wanted, but did not need” is used to measure respondents’ level of impulsivity. The measurement is very close to one of the items included in the Impulsivity Scale devised by Eysenck and Eysenck(1977), “do you often buy things on impulse?” The responses range from “strongly disagree” to “strongly agree”, and are coded as a dummy variable reporting high or low impulsivity. Those with low impulsivity are coded as 0 and respondents with high impulsivity are coded as 1.

**Cognitive bias toward gambling.** The survey item “When I gamble I try to win back money I have lost” is a typical measurement of chasing behavior, and chasing is closely associated with cognitive bias in gambling situations because gamblers with cognitive bias are characterized by chasing behavior (Sharpe & Tarrier,1993). For the analysis, the measurement is dichotomized as a dummy variable that categorizes respondents into high and low cognitive bias groups respectively. The low cognitive bias group is coded as 0 and the high cognitive bias group is coded as 1.

**Cognitive bias toward financial behavior.** This study assumes that if individuals show inconsistency between their perceived practice of financial management and their actual practice of financial behaviors they would be considered to have cognitive bias. As a proxy of perceived practices of financial management, responses to the item “I manage my money well” are used. Responses consist of four categories, ‘strongly disagree’, ‘disagree’, ‘agree’, and ‘strongly agree’ and they are dichotomized to ‘disagree’ and ‘agree’.

Actual practices of financial behaviors include ability to budget, save money, and control spending such as tracking transactions, paying bills on time, and planning for financial future (Perry & Morris, 2005). The survey items “I pay my bills on time every month”, and “I track all debit card transactions/checks to balance my account” are selected as financial behaviors. Considering their limited financial resources and financial situations, paying bills on time and tracking transactions are more plausible financial behaviors for college students to implement compared to saving and financial planning for the future. Each response is dichotomized as ‘disagree’ and ‘agree’. Combining the two measurements, this study categorized respondents as doing ‘good’ practices if they agreed that they paid bills on time and tracked their transactions while as doing ‘poor’ practices if they do none or only one of them.

Respondents are judged to have no cognitive bias if their responses regarding perceived practices and actual practices are consistent. On the other hand, if respondents perceive they manage money well but do poorly at actual practices they are classified as overestimators. If they perceive they do not manage money well but are doing good at actual practices they are considered as underestimators. For the dichotomous variable, both overestimators and underestimates are coded as 1 indicating cognitive bias in financial behavior; otherwise the variable is coded as 0 indicating no cognitive bias.

Table 1

*Classification of No Bias, Underestimators, and Overestimators Group*

		Perceived Practice of Financial Management (I manage my money well)	
		disagree	agree
Actual Practice of Financial Behavior	poor	No Bias	Overestimators
	good	Underestimators	No Bias

**Results**

**Descriptive Results**

The descriptive table (Table 2) shows that only 15.6% of respondents gambled in the last 30 days. Female students make up 68% of the total sample. The majority of the respondents are White (83%), with smaller representations of Black (7%), Hispanic (2%), Asian (3%) and persons who indicated they were of some other race (5%).

Table 2

*Descriptive Table*

Variables		Frequency (%)
Gambling	Non-gambler	4255(84.4)
	Gambler	784(15.6)
Gender	Male	1,597(31.7)
	Female	3,442(68.3)
Race/Ethnicity	White	4,203(83.4)
	Black	356(7.1)
	Hispanic	114(2.3)
	Asian	129(2.6)
	Other	237(4.7)
Rank	Freshmen	943(18.7)
	Sophomore	2,936(58.3)
	Junior	854(16.9)
	Senior	203(4.0)
	Other	103(2.0)
Employment Status	Not Employed	998(19.8)
	Full-time	1,210(24.0)
	Part-time	1,960(38.9)
	Summer	870(17.3)
GPA	Low(- 2.9)	1,187(23.6)
	High(3.0 +)	3,852(76.4)
Attitudes toward gambling	Negative	4,597(91.2)
	Positive	442(8.8)
Subjective Norms of Family Members for financial behavior	Low Compliance	1,911(37.9)
	High Compliance	3,128(62.1)
Subjective Norms of Friends for financial behavior	Low Compliance	4,085(81.0)
	High Compliance	955(19.0)
Impulsivity	Low	3,310(65.7)
	High	1,729(34.3)
Cognitive Bias toward Gambling	Low	4,063(80.6)
	High	976(19.4)
Cognitive Bias toward Financial Behavior	No bias	3,525(70.0)
	Underestimators	458(9.1)
	Overestimators	1,056(21.0)
Total		5,039(100.0)

Over half of the respondents are sophomores (58%). Freshmen and juniors make up 19% and 17% of the sample respectively, with smaller proportions being seniors (4%) or students with at least 4 years of college completed (5%).

Interestingly, more than 60% of respondents reported high compliance with family members' subjective norms with regard to financial behavior while only 19% of respondents complied with friends' subjective norms. This suggests that college students rely more on family members' subjective norms than their friends' in terms of financial behavior. Just over one-third (34%) of respondents were classified as high on impulsivity. With respect to cognitive bias toward financial behavior, 70.0% of respondents are consistent in their perception and practice of financial behavior. More respondents are included in the overestimators category than the underestimators category showing a tendency toward optimism in their financial behavior. Finally, only 8.8% of respondents have a positive attitude toward gambling and 19.4% are included in the category for high cognitive bias toward gambling.

**ANOVA Results**

The ANOVA results are summarized in Table 3. The ANOVA identifies mean differences in gambling frequency between all categories of the independent variables and control variables.

Table 3

*ANOVA Table*

Variables		All(N=5039)		Gamblers(N=784)	
		Mean(SD)	F-value	Mean(SD)	F-value
Gender	Male	.5285(1.749)	36.242***	2.154(2.432)	3.286
	Female	.2804(1.138)		2.512(3.095)	
Race/Ethnicity	White	.3407(1.273)	2.465*	2.176(2.524)	5.223***
	Black	.3539(1.486)		2.864(3.296)	
	Hispanic	.4561(1.564)		2.080(2.827)	
	Asian	.6744(2.522)		4.833(5.159)	
	Other	.4726(1.716)		2.872(3.350)	
Rank	Freshmen	.5037(1.650)	3.816**	2.411(2.908)	.330
	Sophomore	.3232(1.260)		2.228(2.589)	
	Junior	.3314(1.349)		2.339(2.865)	
	Senior	.2512(1.251)		2.833(3.014)	
	Other	.4951(1.668)		2.307(2.740)	
Employment Status	Not Employed	.4299(1.611)	4.763**	2.307(2.740)	1.188
	Full-time	.4702(1.602)		2.442(2.922)	
	Part-time	.2832(1.135)		2.063(2.392)	
	Summer	.2931(1.153)		2.217(2.413)	
GPA	Low	.4406(1.609)	3.153*	2.479(3.090)	1.129
	High	.3339(1.281)		2.244(2.599)	
Attitudes toward gambling	Negative	.2167(.894)	641.279***	1.872(1.954)	44.066***
	Positive	1.839(3.252)		3.226(3.753)	
Subjective Norms of Family Members	Low Compliance	.4118(1.385)	4.607*	2.236(2.520)	.436
	High Compliance	.3267(1.353)		2.366(2.908)	
Subjective Norms of Friends	Low Compliance	.3423(1.297)	3.217	2.259(2.603)	.938
	High Compliance	.4304(1.629)		2.491(3.204)	
Impulsivity	Low	.3054(1.200)	14.871***	2.174(2.490)	2.708
	High	.4615(1.633)		2.502(3.061)	
Cognitive Bias toward Gambling	Low	.2808(1.156)	69.628***	2.145(2.494)	5.871*
	High	.6844(1.985)		2.651(3.174)	
Cognitive Bias toward Financial Behavior	No bias	.3711(1.399)	.687	2.383(2.789)	1.499
	Underestimators	.2948(.994)		1.800(1.831)	
	Overestimators	.3466(1.395)		2.288(2.906)	

Total	.3590(1.366)	-	2.307(2.740)	-
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Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

The mean of gambling frequency for all respondents is .3590, which is small due to the fact that a majority of the respondents are not gamblers and are coded as 0 accordingly. Based on the ANOVA results, the mean gambling frequency differs by gender, attitudes toward gambling, impulsivity, and cognitive bias toward gambling at the .001 level. On the other hand, mean differences in gambling frequency are found between the categories of rank and employment status at the .01 level, while race and subjective norms of family members at the .05 level for all respondents including those who did not gamble in the last 30 days.

The mean gambling frequency for gamblers is 2.307. The mean gambling frequency for gamblers shows differences by race and attitudes toward gambling at the .001 level and cognitive bias toward gambling at the .05 level. The mean gambling frequency for Asian students is high compared to other ethnicity groups, but this difference should be interpreted cautiously since there are only a small number of Asian gamblers in this sample (only 18 students). The large standard deviation for the mean gambling frequency of Asian students with high gambling frequency is consistent with a few Asian students with high gambling frequency that raises the mean compared those of other ethnicity groups. There are fewer statistically significant differences in mean gambling frequency between categories of the independent variables for the subsample of gamblers.

### OLS Regression Analysis Results

The OLS regression analysis for all respondents is presented in Table 4. The OLS regression analysis is used to model college students' gambling frequency with the independent and control variables.

First, when only control variables are regressed on gambling frequency, the indicators for male and Asian student groups are significant. The results are consistent with the previous literature indicating that male college students are more likely to be pathological gamblers (Lesieur et al., 1991; Winters et al., 1998; Stinchfield et al., 2006) and to participate in non-pathological gambling (Browne and Brown, 1994; LaBrie et al., 2003) than female students and being nonwhite is related to pathological gambling (Lesieur et al., 1991; Stinchfield et al., 2006).

After adding variables from the theoretical model, the adjusted  $R^2$  increases from .011 to .118. Previous studies have emphasized demographic variables as risk factors of gambling, however, the effects of the demographic variables on gambling frequency weaken after adding the variables from the theoretical model. For example, gender is not significant anymore and being Asian or of other races increases gambling frequency but only at the .10 significance level. In spite of lower significance level, students from Asian or other ethnic backgrounds still have the higher mean gambling frequency compared to white students.

In the previous literature, employment status of college students does not influence the odds of being identified as probable pathological gamblers (Winters et al., 1998) and the odds of gambling (LaBrie et al., 2003), but students who are employed part-time or during the summer gamble less than those who are not employed in this study. The most common types of gambling activities among college students are buying lotteries, gambling in a casino, and playing cards with friends (LaBrie et al., 2003). These types of gambling are money-involved activities; students pay money for lotteries and casino gambling while they do not always bet money to play card with friends. The results of crosstab analyses are not included in this study, but students who are not employed reported their major financial source for entertainment is money from their parents. This might induce them to spend more money on gambling than those whose main financial source for entertainment is money from their work. Also those who are not employed might have more time to gamble considering the fact that casino gambling and card games with friends are time-consuming activities. However, students who work full-time does not show any mean difference in terms of gambling frequency compared to those who are not employed. This result is unexpected since like students employed part-time or during summer, students employed full-time are more time constrained and more likely to pay for their entertainment from their earnings, and thus would be expected to be less like to gamble compared to students who are not employed. Further research is necessary to explain this unexpected result.

A positive attitude toward gambling ( $p=.001$ ) is the strongest predictor of gambling frequency and thus hypothesis 1 (students with positive attitudes toward gambling will gamble more) is supported. Subjective norms of family members with regard to financial advice are significant at the .10 level, and the coefficient is negative, providing weak support for hypothesis 2 (students who comply with family members' advice on financial management will gamble less). Despite weak

evidence, this is a meaningful result in that it suggests that gambling is related to financial management in the perception of students. On the other hand, subjective norms of friends with regard to financial advice are not significant, rejecting hypothesis 3 (students who comply with friends' advice on financial management will gamble less).

Table 4

OLS Analysis Results

Dependent Variable: Gambling Frequency(N=5039)		Controlled		Model	
		$\beta$	t	$\beta$	t
Gender	(Female)				
	Male	.237	5.689***	.041	1.027
Race	(White)				
	Black	-.019	-.249	.004	.060
	Hispanic	.090	.694	.055	.455
	Asian	.282	2.316*	.199	1.723 <sup>a</sup>
	Other	.119	1.307	.160	1.868 <sup>a</sup>
Rank	(Freshman)				
	Sophomore	-.055	-1.017	-.036	-.701
	Junior	.043	.743	.065	1.189
	Senior	-.004	-.082	-.043	-.838
	Other	.149	1.474	.133	1.397
Employment Status	(No Employment)				
	Full-time	.041	.705	.010	.186
	Part-time	-.127	-2.350	-.114	-2.228*
	Summer	-.146	-2.135	-.141	-2.321*
GPA	(Low)				
	High	-.083	-1.809	-.044	-1.013
Attitudes toward gambling	(Negative)				
	Positive			1.543	22.914***
Subjective Norms of Family Members	(Low Compliance)				
	High Compliance			-.075	-1.901 <sup>a</sup>
Subjective Norms of Friends	(Low Compliance)				
	High Compliance			.019	.403
Impulsivity	(Low)				
	High			.073	1.873 <sup>a</sup>
Cognitive Bias toward Gambling	(Low)				
	High			.145	3.040**
Cognitive Bias toward Financial Management	(No Bias)				
	Underestimators			-.115	-1.791 <sup>a</sup>
	Overestimators			-.032	-.714
F		5.431***		34.821***	
Adjusted R <sup>2</sup>		.011		.118	

Note. <sup>a</sup>  $p < .1$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Impulsivity ( $p < .10$ ) is also weakly related to gambling frequency. The previous studies have confirmed impulsivity as one of the risky factors associated with pathological or problem gambling (Steel & Blaszczynski, 1996; Blaszczynski et al., 1997; Langewisch & Frisch, 1998; Vitaro et al., 1998; Vitaro et al., 1999) while there are only a few previous studies relating impulsivity and non-pathological gambling. Moore and Ohtsuka (1997) revealed a positive relationship between impulsivity and gambling frequency only for girls. In this sense, the impulsivity variable might be a better predictor

of pathological gambling rather than non-pathological one. Hypothesis 4 that students with high impulsivity will gamble more is weakly supported in this study.

Cognitive bias toward gambling ( $p < .01$ ) is significant and the coefficient is positive supporting hypothesis 5 (students with high levels of cognitive bias will gamble more). For cognitive bias toward financial behavior, the underestimator category ( $p < .1$ ) is weakly significant with a negative coefficient suggesting that students who underestimate their financial behavior will gamble less, and thus hypothesis 6A is supported. The coefficient estimate for overestimator group is not statistically significant indicating no difference in gambling frequency compared to the no bias group, and so hypothesis 6B is not supported. Students who underestimate their financial behavior might be more concerned with their financial situations and this concern might cause them to gamble less. In sum, the results of the OLS analysis are consistent with the assumption that gambling can be conceptualized as financial behavior, and most variables based on the theoretical model are supported.

Significant differences that were found in the ANOVA results are either weakened or absent in the OLS results with the exception of attitudes toward gambling. Most of the demographic variables do not have significant effects in the OLS results, implying that the variables from the theoretical model explain gambling better. In addition, one of the indicators of cognitive bias toward financial behavior, underestimators, becomes weakly significant in the OLS results, compared to no difference based on the ANOVA results. Controlling demographic variables appears to allow the hypothesized effect of cognitive bias toward financial behavior to be captured, albeit the marginal effect is small.

### Logistic Regression Analysis Results

Logistic regression is used to predict the probability of gambling as a function of the independent and control variables. The results of the logistic regression analysis will be briefly discussed and compared to the OLS results. The gender effect ( $p < .05$ ) is significant indicating that male students are more likely to gamble than female students. Since the indicator variable for being male was not significant in the OLS model, the result suggests that gender has more influence on the propensity to gamble than gambling frequency.

Next, being Black or Asian lowers the odds of gambling ( $p < .10$ ). This result is contradictory to the results obtained from the OLS indicating that Asian students gamble more than White students. This might be due to a relatively smaller number of the respondents who are Asian or Black in the sample. Also, considering the fact that gambling frequency of Asian students who gambled is extremely right-skewed compared to other ethnic groups, being Asian has a great impact on gambling frequency. However, it is interesting that being Asian reduces the odds of gambling. This inconsistency may be partly explainable by the mixed attitudes toward gambling in the Asian countries. In some of the Asian countries, playing lotteries and gambling with family or friends are widely acceptable and perceived enjoyable while gambling in casino is illegal or perceived immoral even in the countries where gambling is legal (Vong & Kwan, 2004). Thus, the contradictory views on gambling in the Asian culture may explain the opposite effect of being Asian on gambling propensity and gambling frequency.

In addition, students who indicated their rank as other (more than four years) are more likely to gamble than freshmen. This result is similar to LaBrie et al.'s study (2003) that being older than 20 is related to gambling, which is associated with a legal age of gambling in the U.S. In the state where this data was collected, the legal age of gambling is 18, and the legal age for casino gambling is 21. Students who indicated their rank as other are probably older than 21, being older than the legal minimum age of gambling increases the odds of gambling.

Moreover, the direction of effects and the level of significance are consistent between the logistic analysis and the OLS results for being employed part-time and during summer, having positive attitudes toward gambling, and displaying a high level of impulsivity. On the other hand, the significance of cognitive bias toward gambling and subjective norms of family members with regard to financial behavior increase from .01 to .001 and from .10 to .001 respectively. This reveals that the two variables are better predictors in a decision to gamble or not instead of gambling frequency. Finally, cognitive bias toward financial behavior is not significant indicating the variable fails to explain the odds of gambling.

Table 5

*Logistic Regression Analysis Results*

Dependent Variable: (Not Gamble) Gamble (N=5039)		$\beta$	Model P-value	Exp( $\beta$ )
Gender	(Female)			
	Male	.214	.017 <.05	1.239
Race	(White)			
	Black	-.337	.062 <.10	.714
	Hispanic	.355	.157	1.426
	Asian	-.514	.076 <.10	.598
	Other	.125	.513	1.133
Rank	(Freshman)			
	Sophomore	.102	.392	1.108
	Junior	.072	.577	1.075
	Senior	.029	.810	1.029
	Other	.448	.025 <.05	1.565
Employment Status	(No Employment)			
	Full-time	.113	.357	1.120
	Part-time	-.201	.090 <.10	.818
	Summer	-.366	.012 <.05	.694
GPA	(Low)			
	High	-.105	.282	.900
Attitudes toward gambling	(Negative)			
	Positive	2.115	.000 <.001	8.289
Subjective Norms of Family Members	(Low Compliance)			
	High Compliance	-.376	.000 <.001	.687
Subjective Norms of Friends	(Low Compliance)			
	High Compliance	.065	.554	1.068
Impulsivity	(Low)			
	High	.152	.087 <.10	1.164
Cognitive Bias toward Gambling	(Low)			
	High	.463	.000 <.001	1.589
Cognitive Bias toward Financial Behavior	(No Bias)			
	Underestimators	.021	.889	1.021
	Overestimators	-.060	.571	.942
-2 Log likelihood			3816.521	
Cox & Snell R <sup>2</sup>			.102	
Nagelkerke R <sup>2</sup>			.176	

**Conclusion**

The concepts of impulsivity and cognitive bias were incorporated into the Theory of Reasoned Action as a framework for understanding gambling behavior of college students. Attitudes toward gambling and cognitive bias toward gambling were the two strongest predictors of gambling frequency and gambling propensity. Subjective norms of family members with regard to financial behavior were also related to gambling frequency and gambling propensity. Impulsivity was more strongly associated with gambling propensity than gambling frequency while cognitive bias toward financial behavior was only weakly associated with gambling frequency and was not associated with gambling propensity. Previous research on college student gambling has examined demographic characteristics as important risk factors of gambling (Lesieur et al., 1991; Browne & Brown, 1994; Winters et al., 1998; LaBrie et al., 2003; Stinchfield et al., 2006). We find that variables from our theoretical model add important explanatory power beyond the demographic characteristics suggesting that concepts

related to attitudes, norms, impulsivity, and cognitive processing are important in understanding gambling behavior of college students.

While much of the previous research focuses on pathological gambling, we consider students gambling in the context of rational economic choice and model gambling within the larger context of college student financial behavior. Our empirical result that students who underestimated their financial behavior gambled less provides weak support for this broader college student financial behavior approach.

This study also highlights the importance of family members' advice about financial behavior on gambling. This result supports Furnham's (1986) suggestion that gambling might be considered as an economic behavior, not unlike saving and managing money, which is influenced by parents' advice and instructions. Due to data limitations, we were unable to directly measure the family members' subjective norms with regard to gambling. However, our results do provide evidence that general financial advice from family members influences college students' gambling behavior.

Results from our OLS analysis for gambling frequency and the Logistic analysis for gambling propensity suggest that the effect of a variable on frequency may be different from its effect on propensity. Further research is warranted to confirm these results, but such results may suggest that different strategies may need to be employed to educate college students in gambling situations. For example, among students who gamble, Asian students gamble more than other ethnic groups. However, being Asian lowers the odds of gambling. This may have implications for programming. For example, while Asian student population may not be a target population for general education, within the population of students who gamble, targeting Asians might be appropriate and enable more meaningful programming.

In future research, data that includes information on past experiences of gambling would enable exploration of potential variables associated with gambling frequency or gambling propensity that we were not able to explore in this study. Also, further exploration is required to clarify the relationship between employment status and gambling frequency and gambling propensity of college students, and to inform the mixed results found in this study.

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