

WHAT'S THE LINE? THE INFLUENCE OF NUMERICAL LITERACY ON THE
PERCEPTIONS AND EVALUATIONS OF SPORT ODDS

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Colin López
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Examining Committee Members:

Dr. Daniel C. Funk, School of Sport, Tourism and Hospitality Management (Chair)
Dr. Bradley Baker, School of Sport, Tourism and Hospitality Management
Dr. Joydeep Srivastava, Fox School of Business
Dr. Stephen L. Shapiro, College of Hospitality, Retail, and Sport Management,
University of South Carolina (External Reader)

ABSTRACT

In 2018, the United States Supreme Court overturned PASPA, a law which had previously deemed sports betting illegal. Following this ruling, states have already or have begun passing legislation which legalizes sport betting. As legalization continues to sweep the nation, an untapped domain of research has emerged. From a sport management perspective, there is a new, highly lucrative sport industry with which there is minimal research. The main purpose of this research project is to examine how bet presentation influences consumer behavior related to sports gambling. Specifically, the role that bet format presentation has on consumers' willingness to bet and the amount they are willing to bet. Additionally, the potentially mediating effects of numeracy and team identification were examined. Participants (N=703) were recruited from the United States, United Kingdom, and Australia, as these locations natively use different forms of bet presentation (American, fractional, and decimal). This study utilized a Latin square experimental design that examined whether participants were willing to bet more money when shown American odds first compared to fractional odds first. Further, evidence was provided demonstrating the positive mediating influence of team identification, and the influence of subjective numeracy. Practically, the results from this study can inform sports betting organizations, sports betting consumers, as well as government and industry regulators. Theoretically, knowledge is contributed to the domains of sport management, behavioral pricing, and appraisal theory literature.

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TABLE OF CONTENTS

ABSTRACT..... ii

ACKNOWLEDGMENTS iii

LIST OF TABLES iv

LIST OF FIGURES vi

CHAPTERS

1. INTRODUCTION 1

 Problem Statement 2

 Purpose of Study 5

 Research Questions 5

 Significance of Study 5

2. BACKGROUND 7

 Legalization and Proliferation of Sports Betting 7

 Legalization Concerns 8

 Support for Legalization 9

 Sports Betting Research 10

3. LITERATURE REVIEW 14

 Appraisal Theory 14

 Willingness to Bet 17

 Behavioral Pricing 19

 Face Value 21

 Familiarity 21

Heuristics	24
Numerical Cognition.....	24
Numeracy	25
Sport Management & Team Identification	27
Research Summary	30
Hypotheses and Research Model	31
4. METHOD	34
Manipulations	34
Bet Presentation Format.....	34
Independent Variables	35
Betting Familiarity	35
Numeracy	35
Team Identification.....	36
Internal Validity Checks	36
Comprehension	36
Implied Probabilities	37
Dependent Variables	37
Willingness To Bet	38
Amount Willing To Bet	38
Procedures	38
Analysis.....	41
Pilot Test.....	41
Participants.....	43

Data Collection	48
Data Analysis	48
5. RESULTS	50
6. DISCUSSION	68
Bet Presentation	68
Familiarity	71
Numeracy	72
Team Identification	74
Sports Betting Research	72
7. IMPLICATIONS	77
Theoretical Implications	77
Practical Implications	80
8. LIMITATIONS AND FUTURE RESEARCH	85
9. CONCLUSION	90
REFERENCES	92
APPENDIX A: EXPERIMENT CONSTRUCT EXAMPLES	103
APPENDIX B: IRB APPROVAL	104
APPENDIX C: COMPETING MODELS	105

LIST OF TABLES

Table 1	39
Table 2	41
Table 3	41
Table 4	44
Table 5	44
Table 6	45
Table 7	46
Table 8	48
Table 9	52
Table 10	55
Table 11	57
Table 12	59
Table 13	60
Table 14	62
Table 15	63
Table 16	65
Table 17	67
Table 18	67
Table A1.....	105
Table B1.....	107
Table A2.....	109
Table B2.....	111

Table A3.....	112
Table A4.....	114

LIST OF FIGURES

Figure 1: Conceptual Model	32
Figure 2: Experiment Map	40
Figure 3: Amount to bet with gambling familiarity	53
Figure 4: Willingness to bet with familiarity of gambling	53

CHAPTER ONE

INTRODUCTION

In May of 2018, the United States Supreme Court struck down a 1992 federal ban on sports betting on the grounds that it intruded upon individual states rights. Since then, more than thirty states and Washington D.C. have passed legislation joining Nevada, previously the only U.S. state exempt from this ban, in legalizing sports betting. Many more states are in the process of crafting such regulation: Perhaps most interestingly, only three states have not yet made an effort to pass any form of legislation involving sports betting. As a result, a brand-new, highly lucrative legal market has emerged within sport. Analysts have predicted that by 2025, the sports betting market will hit \$37 billion in total revenue (MarketWatch, 2022). Undeniably, sports betting is positioned to alter the landscape of the sport industry.

The emergence of legalized sports betting has already altered the U.S. sport consumer market by introducing a recently legal avenue for consumers to spend money and for sport organizations to increase their profits. As a result, U.S. sport organizations and sportsbooks are left with questions about how to offer sports betting most optimally. Across Europe and Australia, sports betting has been legal and promoted for decades. In the United Kingdom, sports betting has been legalized since the 1960s, with over 1000 betting shops operating out of London alone (Betting Commission, 2019). In Australia, a government survey found that over 574,000 individuals regularly engaged in sports betting (Armstrong & Carroll, 2017). Similarly, betting culture is pervasive throughout Europe, with many soccer and rugby teams partnering with betting companies for kit and stadium sponsorships (Danson, 2010). For example, during the 2019-20 Premier League

season, revenue from shirt sponsorships was estimated at nearly £349 million, and half of those sponsors were sports betting companies (Davies, 2019). As legalization continues across the U.S., this sort of influence from betting companies will become more prevalent.

Problem Statement

This movement in the U.S. toward legalization, in conjunction with the rise of online betting websites, has given gamblers access to sportsbooks based not only in the United States but also globally. As a result, major online sportsbooks in the United States have begun to offer the ability to view betting odds in differing formats – the American format, the United Kingdom’s fractional odds, or the European and Australian decimal odds. For example, an individual may have an interest in betting on an English Premier League soccer match. Typically, U.S. websites default to showing odds for Manchester United at +200, which means for every \$100 wagered, the consumer will win \$200. Most major sports betting websites offer the ability to see the odds in the American presentation (+200), using the UK’s fractional odds (2/1), or the European/Australian decimal odds (3.0). Although each presentation looks different, they represent the exact same betting odds, but each presentation requires different math to figure out. With a newly legalized industry and consumers who may lack familiarity, understanding how the presentation can influence consumers is of interest to industry, consumers, and government officials.

With the understanding that consumers can view bets with different presentations of odds, it is necessary to utilize a theory which can examine this phenomenon. Appraisal theory broadly examines the way that consumers appraise various situations and stimuli.

More specifically, numerical cognition and mental accounting theory provide a theoretical background which accounts for both the economic and cognitive reasons behind consumer decision making. Further, research on behavioral pricing has shown that different prices can influence how consumers process information as well as the judgements and decisions they make. While this research has generally focused on prices related to goods and services and prices in different currencies, it has yet to examine different bet pricing formats, which each have their own associated mathematical calculations. This is especially important in the U.S. context, where high mathematical ability cannot be assumed: For example, according to one study, individuals in the U.S who had completed high school performed similarly to high school dropouts of other countries (Anderson, 2016). This notion of Americans' math struggles has been seen time and time again in popular press articles and can be attributed to low levels of numeracy.

The concept of numeracy refers to an individual's ability to perform math functions, a parallel concept to literacy or an individual's ability to read. Individuals with lower numeracy are more likely to display *math anxiety*, which has been defined as "tension and anxiety that interferes with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations" (Richardson & Suinn, 1972, p.551). Further, high numeracy has shown to reduce perception distortions on probability outcomes associated with betting (Patalano et al., 2015). Thus, consumers looking to determine the odds of a bet and its potential payout need to have a certain level of numeracy to accurately determine this information. In addition to numeracy, other psychological factors which can influence betting behavior must be considered.

Within the sport management literature, team identification is defined as the level of psychological attachment between a fan and their favorite team (Wann & Branscombe, 1993). Team identification is a variable which has been shown to influence cognition, affect, and behavior of sport fans in a variety of manners. Research has shown that for high identifiers, team identification functions as a heuristic, or decision-making aid that comes from prior experience (Madrigal, 2001). In a sports betting context, it is impossible to remove the potential bias associated with team identification when placing bets. As such, it is imperative to examine the role of team identification as a heuristic regarding consumers decisions to place sports bets.

This research utilized the lens of decision making, a common framework for examining betting or gambling behavior. Research examining sports betting has shown that sport gamblers are subject to a variety of heuristics or biases which may lead to the gambler overestimating their chances of winning, such as the *illusion of control* where gamblers mistake a game of chance for a game of skill (Thompson et al., 1998). When math is introduced, research has shown the negative impact on performance of math anxiety (Ashcraft, 2002). Other research has shown that when there is some skill involved, gamblers frequently treat the skill as excessively impactful (Clark, 2010). As research has demonstrated multiple heuristic influences, it is logical to assume that the heuristics associated with gambling odds, which function as the price of a sports bets, also play a role in influencing consumer behavior.

Purpose of Study

The purpose of this study is to examine potential biases that affect the decision making and consumer behavior of individuals who are presented with sports bets using an appraisal theory approach. The goal of this research is to provide insight into how numeracy and team identification, both possible sources of cognitive bias, influence consumer's betting behaviors – specifically, in terms of willingness to bet and amount consumers are willing to bet, when presented with different sports betting odds formats. These findings can be shared to help consumers gain awareness of potential unconscious biases which may influence betting behavior; to help sports betting companies increase overall action and revenue; or to help government and industry regulators develop necessary and informed consumer protections.

Research Questions

The following research questions were proposed to guide this research.

RQ1: What role does the bet presentation have on consumer behavior in a sports betting scenario?

RQ2: What role does numeracy play in consumer decision making regarding sports betting?

RQ3: What role does team identification play in consumer decision making regarding sports betting?

Significance of Study

This study will demonstrate the potential biasing influences of numeracy and team identification, and their potentially conflicting influences on consumer decision making in a sports betting context. Appraisal theory notes that individuals have different

emotional responses when presented with different types of stimuli. Mathematical ability and team identification both have demonstrated emotional influences which may potentially influence consumer behavior. Research has demonstrated that consumers with math anxiety will have negative emotional responses when presented with math. These findings contribute not only to the knowledge base of sport management, but also of decision making and numerical cognition.

CHAPTER TWO

BACKGROUND

Legalization and Proliferation of Sports Betting

As more U.S. states open their doors to sports betting, more efforts have been enacted to attract customers. To reach as many customers as possible, sports betting websites have offered the ability to view odds native to different regions – the American odds presentation (+/-200), UK fractional odds (2/1), and European decimal odds (3.0).

For sports gamblers or those interested in placing bets, understanding how to calculate payouts for each presentation is a priority for determining how much money could potentially be won. European decimal odds have the simplest mathematical calculation – simply multiply the initial investment by the decimal number to determine the total payout. For example, if an individual makes a \$100 bet using decimal odds of 3.0, they will be paid out \$300 for a winning bet. Calculating payouts based on American odds are much more convoluted. When betting on underdogs, the number represents how much money an individual will win if a \$100 bet is placed. For example, if a consumer makes a \$100 bet on a +200 line, this implies winning \$200, resulting in a total of \$300 payout (getting their initial \$100 investment back as well). On the other hand, when betting on a favorite, the number represents how much money an individual needs to put down to win \$100. If someone wants to make a bet on a game with -200 odds, this means that the consumer will have to put down \$200 to win \$100, again resulting in a \$300 payout. Finally, for UK fractional odds, if a consumer bets on a 2/1 listing, the 1 represents money put down by consumers, while the 2 represents the payout. Thus, for

this example, a \$100 bet would win the individual \$200, again resulting in a \$300 total payout.

For those unfamiliar with sports betting, these different formats can be confusing. As a result, multiple sports betting websites have opted to provide FAQs spelling out how to calculate odds. Nevertheless, this potential unfamiliarity with sports betting has led to a chorus of voices discussing the potential downsides of legalization of sports betting.

Legalization Concerns

The sports betting legalization movement in the United States has not been met with universal approval. The Players' Associations for the MLB, NBA, NFL and NHL put out a joint statement urging more caution and assurances that players' privacy, publicity rights, and the integrity of the games would not be negatively impacted (Sportsnet, 2018). Experts in the area of betting addiction and politicians have advanced their own concerns regarding the legalization of sports betting. While others have noted that, mathematically speaking, sports betting is a losing proposition in the long run, even for the most experienced gamblers (Baraniuk, 2016).

One opponent to legalized betting, U.S. Representative Valarie Hodges of Louisiana, noted how betting can be appealing to the poor and uneducated and urged for earlier education surrounding sports betting (Mulvihill, 2019). Additionally, in 2018 Senator Charles E. Schumer put forth a federal framework regarding consumer protections in sports betting. Specifically of note is section 3c, where Senator Schumer states:

“Protecting consumers and individuals placing bets. As sports betting becomes legal it is important that those choosing to place bets are able to avail

themselves of the same protections afforded to other consumers. To that end, I would: [...] Provide appropriate consumer protections and requirements that deter unfair or deceptive practices, and provide safeguards against financial crimes and predatory tactics” (p.2).

Taken in conjunction, sports betting may disproportionately affect those with less education or math skills. Even further, research has also demonstrated that individuals high in team identification are also more likely to place bets on their favorite team, appearing to favor emotional connections over logical deductions (Na et al., 2019). When considered together, it is clear there is a need to provide protections for these individuals. As such, there is need to focus research on sports betting to determine if how consumers view bets could be considered potentially biasing in a way that negatively effects the consumer’s wallet.

Support for Legalization

Despite these concerns, others have declared their support for betting legalization. Many prominent sports owners and commissioners have voiced support for legalized sports betting while also noting the need for consumer protections. Ted Leonsis, owner of the Washington Wizards and Washington Capitals, said in a statement, “[Legalization] brings a multi-billion dollar industry out of the shadows and into the sunlight, where its integrity can be guaranteed and consumers can be better protected.” NFL Commissioner Roger Goodell said legal betting guidelines must provide substantial consumer protections; ensure fans will have access to official, reliable league data; and that law enforcement will have the resources, monitoring and enforcement tools necessary “to protect our fans and penalize bad actors here at home and abroad” (Associated Press,

2019, para. 3). As the opportunity to profit exists, it is understandable that sport organizations would be eager to stake their claim in this new market.

From a sport business perspective, the legalization of sports betting presents opportunities for multiple parties. One study identified 12 groups that stand to benefit: sports leagues, specific sports, teams and players, sponsors of various sports entities, fans, the media, the gaming industry, online betting agencies, gamblers, the hospitality industry, governmental entities, and society-at-large (Fullerton et al., 2019). Some of these benefits include revenue in the form of integrity fees (e.g., fees that sports betting operators pay to leagues to ensure accurate information), increased awareness of lesser-known sports, potential sponsorship and endorsement deals, more information available to fans, increased involvement from fans, new media opportunities, increased consumer protections, a new target market, and potential tax revenue. Legalization will increase accessibility to this activity, and the longer it remains legal, the corresponding negative stigma should decrease similarly to other issues which have been legalized such as marijuana use (Aranda et al., 2021). Overall, it can be argued that the legalization of sports betting will increase the overall revenue within the sport industry in total.

Sports Betting Research

Academic research has expressed concerns regarding consumer protection when engaging in both online and in-person sports betting. However, recent data shows online sports betting brings in far more revenue than in-person sports betting. An early article concerned with consumer protections made the recommendation for “legalization and regulation of internet betting through existing land-based casinos” (Watson et al., 2004, p.209). This recommendation was made noting that when activities are forced to an

illegal betting market, there is a complete absence of consumer protections, and the likelihood of negative outcomes increases drastically. By bringing the issue to light, both federal and state governments can provide these necessary protections to ensure consumers are not being swindled by unchecked or unknown entities. Other research has noted that trust as well as other consumer attitudes are a driving force for online betting behavior (Gainsbury et al., 2013). Results from the same study note that over one-third of respondents (n=8952) reported having a dispute with an internet betting site, while only 49.3% reported that the dispute was resolved. As such, it appears that the current legislative direction of legalization and regulation should help ease consumer fears regarding online betting. Thus, researching the sports betting market can help better inform consumers, organizations, and governments as to any potential unconscious biasing effects.

There is also a substantial field of literature that examining sports gamblers' behaviors and perceptions related to sports betting. For example, some common cognitive biases have been found within individuals who gamble that influence the perception of concepts such as statistical likelihood, probabilities, or the independence of betting events (Ladouceur et al., 2001). Moreover, individuals who gamble on *skill games*, such as poker or sports betting, are more likely to present a higher number of these cognitive biases compared to those who play games of pure chance (such as dice or roulette) (Myrseth et al., 2010), and frequent gamblers are more likely to display these distortions than infrequent or non-gamblers. Despite those who engage in sports betting feeling like they may have more control over the outcome, research has shown that those who engage in sports betting typically perform no better than random selections regarding turning a

profit (Ladouceur et al., 1998). One study found that nearly 63% of participants believe their sport knowledge increased their odds of turning a profit (Cantinotti et al., 2004). These findings point to an underlying cognitive issue associated with sports gamblers, ones that sports books consider when generating lines.

The general school of thought is that sportsbooks set lines in order to attract equal action on both sides of the bet. In reality, research has demonstrated that bookmakers take public perception into account and are likely to set the final line based upon the public's perception of teams (Paul & Weinbach, 2008, 2011, 2012). In other words, the level of sport fandom of sports bettors can influence how the line is set. Additionally, teams in large markets will have a larger pool of more identified fans to draw from, as is noted with the principal of double jeopardy (Doyle et al., 2015). As such, the gambling lines involving nationally popular teams generally attract more action than games involving unpopular teams – as can be seen from Business Insider's list of NFL teams most bet on, with the New England Patriots and Dallas Cowboys topping the list (Fulmer, 2011). This public perception can be viewed as a heuristic leveraged by sports gamblers to make decisions. Bookmakers are charged with trying to get the most possible number of people to bet on any single given outcome. As a result, the lines set by bookmakers are likely to change based not on the statistical matchup but on the emotional and cognitive view of teams from the betting public (Miller & Davidow, 2019). Given the effect of cognitive biases on consumers and their incorporation into sportsbook lines, it is likely that other factors, such as the presentation of betting odds, could also have a similar effect on consumer behavior.

Thus, this research aims to understand how the presentation of betting odds influences consumer decision-making and behavior, while also examining how numeracy and team identification interact to influence consumers. Based upon a given individual's level of numeracy and team identification, these could be conflicting variables which influence behavior in opposing manners. An understanding of how consumers perceive and react to different betting odds as well as how numeracy and team identification interact, could inform consumers of potential unconscious biases, could influence how sports teams manage their marketing campaigns with sports betting sponsors, and could help provide direction to lawmakers about potentially predatory behavior.

This research will first examine the relevant literature, beginning with the lens for this study – appraisal theory. Concepts from consumer behavior and decision making are also covered, before looking more in depth to numeracy and team identification. After all relevant literature has been covered, the method of examination will be detailed. The research will then examine and discuss the results of the study in detail. Lastly, the implications, future directions, and limitations will be addressed.

CHAPTER THREE

LITERATURE REVIEW

Appraisal Theory

This research will be conducted utilizing the framework of appraisal theory. Appraisal theory states that individuals appraise situational events in terms of consequences for their well-being, physical or psychological – meaning that emotions arise from the cognitive appraisal of an event versus the event itself (Lazarus, 1991). For example, imagine a potential bet between two teams. Without deeper appraisal, the event may be seen as unappealing or negative, as there is a risk of losing money. However, when appraising the situation, the person realizes that their favorite team is involved in the potential bet. As such, the appraisal results in a positive, not negative emotion. Even further, perhaps if the favorite team is seen as an underdog, a negative emotion could arise. Whether an individual has a positive or negative emotional response are based off two primary, potentially related appraisals: whether individuals care about an event (personal relevance and importance) and then whether the event is good or bad for him or her (weighing the potential positive benefits versus negative consequences) (Smith et al., 1993).

For this research context, appraisal theory states that when sport gamblers appraise different bets, each set of odds as well as the teams involved can elicit different emotional and cognitive reactions that influence the choice to place a bet. Because the calculation of differing odds requires different levels of mathematical ability, the way that odds are presented may yield more negative cognitive or emotional reactions than

others. Further, the presence of a favorite team may elicit more positive cognitive or emotional reactions that increase the chances of placing a bet.

Early research on appraisal theory developed a structural model of appraisal. According to Lazarus (1991), any theory regarding emotion involves relational, motivational, and cognitive aspects. The relational aspect was described as the relationship between an individual and their environment, suggesting that emotions always require an interaction between the two. For example, the emotional response for a sports fan watching a game alone on television versus at the live event will result in different emotional responses due to the difference in environment. The motivational aspect is described as the individual's assessment of the primary goals and evaluation of how relevant a situation is to achieving personal goals. In the case of sports betting, the motivation could be for entertainment or for financial purposes. The cognitive component refers specifically to the cognitive processes that individuals use to evaluate how relevant and significant a situation is to an individual (Lazarus, 1991) and will be the primary focus of this research. As all situations can be evaluated differently, these evaluations will result in differing emotional responses.

It is important to note that the cognitive appraisal process is broken down into two categories: primary appraisal and secondary appraisal (Lazarus, 1991). An individual's primary appraisal refers to an evaluation of two specific aspects of a situation: motivational relevance and motivational congruence (Smith & Kirby, 2009). Research has shown that when a situation is highly relevant to an individual, it elicits a more intense emotional response (Smith & Kirby, 2009). Further, the message's perceived level of consistency with an individual's own goals also were shown to influence level of

emotional response (Smith & Kirby, 2009). In the context of sports betting, the primary appraisal refers to an individual determining if a potential bet on a team to win is relevant and congruent to their motivations – such as earning as much money as possible or engaging with betting for social enjoyment.

The next stage, secondary appraisal, includes individual's evaluations of the outcome and potential options for coping with loss (Lazarus, 1991). For example, an individual may attempt to determine who should be held accountable, where the blame can be put upon themselves or an outside source. Coping options include a wide variety of behaviors that attempt to mitigate the negative emotions experienced. The secondary appraisal will occur after the bet has been placed and may again be re-evaluated after the bet has been decided. An individual may look to assign blame to players or a team for a negative outcome or lost bet. However, for successful wagers, an individual may take more personal credit for the success. Furthermore, coping strategies may be employed through behavior such as placing more bets, smaller bets, or avoiding betting altogether. As a result, appraisal theory suggests when presented with sports bets, individuals will have varying levels of cognitive processing, which can in turn influence both primary and secondary appraisals.

Within the decision-making literature, researchers have found a valuable niche for appraisal theory as it proposes a close relationship between emotion and behavior. Frijda (1986) conceptualized emotions as changes in action readiness, meaning they can influence consumers to engage or disengage with an object or action. Specifically, positive emotions were found to relate with increased engagement while negative emotions were associated with avoidance (Lazarus, 1991). Regarding affective

evaluations, individual's feelings can bias information processing, evaluation, and behavior (Schwarz & Clore, 1983). Within sport management literature, research examining sport consumer behavior has noted that developing a positive emotional connection is useful in predicting loyalty and behaviors (Funk, 2017). While research has demonstrated the relationship between emotion, cognition, and behavior, it is necessary to examine these factors in the emerging market of sports betting.

The current research focused on examining the emotional and cognitive influences of appraisal theory interact within a sports betting context. Research which has focused on appraisal theory has found that appraisals are wide-ranging. Appraisals can be conscious, complex, and require high-level cognitive processing (Lazarus, 1991; Smith & Kirby, 2000) or could involve simpler nonconscious, lower-level cognitive processing which are more likely to be influenced by heuristics (Spitzer et al., 1994). Roseman and Smith noted, "That appraisal can occur at both conscious and unconscious levels suggests that evaluations from the different levels can sometimes be in conflict (p.7)."

As a result, it was anticipated that the cognitive and emotional influences of numeracy and team identification work in conjunction to influence consumer behavior and decision making when making sports bets. Appraisal theory provides a valuable foundation to examine a context which requires multiple appraisals and influences the specific consumption behaviors of willingness to bet and how much consumers are willing to bet.

Willingness to Bet

Within the marketing literature, willingness to buy and willingness to pay are common dependent variables. Willingness to buy is a measure that generally uses Likert-

scale measurement to determine where consumers are along the spectrum of “not at all likely” to “extremely likely” to buy a given consumer product. Likewise, willingness to pay is defined as “a measure of the maximum amount of money that a consumer is willing to give up, to procure a good [...] or to avoid an undesirable bad” (Lusk & Shogren, 2007, p.35). For this research, I adapt and adjust willingness to buy and willingness to pay to the sports betting context by introducing the concepts of willingness to bet and amount willing to bet. Adaptations must be made because when participants are given a willingness to pay measure, the good in question has a specific price set by the seller. However, in a sports betting context, a consumer is not only able to decide if they would like to partake in the bet, but they are able to set their own level of investment. As such, it is necessary to not only capture a participants’ level of willingness to bet, but also the amount they are willing to bet.

Gibson, Sanbonmatsu, & Posavac (1997) examined individual’s willingness to bet in different scenarios: They found that, when given information that focused on one specific team, participants not only overestimated the likelihood that team would win, but they also displayed a greater willingness to gamble on the matchup. The authors suggest that this focus on one team may be the reason why fans are more likely to overestimate or bet on their favorite team. To operationalize willingness to bet, the authors simply presented participants with different options and compared which bets received the most attention.

For the current study, willingness to bet needed to be modified to fit a Likert-scale to compare between the differing presentations. Additionally, participants were asked how much money they would be willing to place on the bet. Research has shown that

sports betting advertisements are more likely to display bets that have a large payout for a small initial investment (Lopez-Gonzalez & Griffiths, 2018). In reality, the behavior of individual's placing bets is unknown and *whale* gamblers, which are the few individuals who gamble large amounts of money, have the potentially to significant bias data.

Examining these two variables provides a comprehensive overview of both the likelihood of engaging in a bet and what level of economic commitment they would be willing to make, both of which have been examined within behavioral pricing literature.

Behavioral Pricing

Behavioral pricing research examines how the presentation of a price influences the perceived value and consumers' choices (rather than the act of price setting). In the context of sports betting, the betting odds imply the price of the bet. Behavioral pricing research aims to bring consumer's psychological perspectives into their reactions to prices with the end goal of understanding how different reactions develop. This is done by focusing on consumers' personal processes of the perceptions, evaluations, and memories of prices which then influence their consumption and spending behavior (Cheng & Monroe, 2013). Behavioral pricing helps explain displayed effects that are unable to be accounted for based on economic principles alone (Krishna, 2009). The value of behavioral pricing research is specifically targeted at price management, as it has been demonstrated that improving the quality of price-setting decisions and how pricing tactics are employed has an immediate impact on overall revenues (Marn & Rosiello, 1992).

Within behavioral pricing research, three key components have been highlighted: mental accounting, effects of background variables and processing fluency (Liu &

Soman, 2008). Mental accounting proposes “that individuals follow a cognitive version of cost accounting to organize and interpret transaction information as the basis for making a decision (Liu & Soman, 2008, p.660).” These mental accounts can be used for single one-off transactions or broadly for spending categories; for a fixed temporal timespan (e.g., a weekly or monthly budget) or over an extended period (e.g., a year). In a sports betting context, these mental accounts can be used for types of bets made, wins and losses accrued, or how often a bet will be made. One popular concept from mental accounting is loss aversion, which demonstrated how individuals frame potential gains versus losses (Tversky & Kahneman, 1974, 1981). Loss aversion mental accounting states that the ability to avoid losing money has a larger impact on consumer preferences than that of potential gains. Because of this, it is anticipated that mental accounting will take place in sports betting contexts.

Background variables in behavioral pricing may refer to concepts such as choice sets, reference points, as well as price image. In a sports betting context, a choice set would refer to different bets available and their corresponding odds and payouts. Simonson and Tversky (1992) developed two approaches for how consumers approach choice sets – tradeoff contrast and extremeness aversion. Tradeoff contrast refers to how preferences for alternatives are enhanced or hindered based upon the tradeoffs of that option being perceived as favorable or unfavorable. Extremeness aversion claims that when presented with two options, a moderate option will be viewed more favorably than an extreme one. In a sports betting context, the teams and presentation of odds that consumers see may influence the tradeoff contrast between different bet options. Further,

participants may be more likely to engage with bets whose odds are moderate and less likely to engage with bets with more extreme odds.

Lastly is the concept of processing fluency. This specifically refers to the ease with which a certain type of information is processed. Research has demonstrated that a feeling of familiarity with a concept is a significant predictor of processing fluency (Jacoby & Dallas, 1981). As a result, both the level of familiarity with betting as well as familiarity with mathematical calculations may influence how consumers process betting odds. Perception of choice sets and the accompanying processing fluency can also be influenced by previous experience and reference points which can take the form of face value.

Face Value

The heuristic of face value has been studied extensively within behavioral pricing literature. Face value refers to a type of money illusion effect which documents a bias in assessing transactions including money because of overweighting nominal values when compared to real values (Shafir, Diamond, & Tversky, 1997). In the current context, this applies to the different presentations of betting odds. For example, those unfamiliar with American odds may overestimate the payout of the bet because the number is presented in base hundred units, while fractional and decimal odds are based on single-digit units. It has been argued that face value is utilized “as a natural anchor because it is the most accessible and perceptually salient information” (Raghubir & Srivastava, 2002, p.336). Furthermore, some have proposed that the face value effect depends on the extent to which an individual has the ability, opportunity, and time to process information regarding exchange rates (Raghubir & Srivastava, 2002). Additionally, as different bet

presentations convey the same information in different numerical ways, it could be argued these bets function similarly to exchange rates. For example, if a consumer is only familiar with American odds, they need to convert this (i.e. +300) to decimal (4.0) or fractional (3/1) if they want to accurately understand the bet. Further, these conversions require different levels of mathematical ability which will vary between individuals.

The sport management literature has also examined the role of face value, usually focusing on ticket or merchandise pricing. As noted in one article, “Within the sport industry, external reference prices take the form of a face value” (Drayer & Shapiro, 2011, p.392). Furthermore, the authors suggest that while face value may not necessarily reflect consumer value accurately, it can serve as a reference point which in turn influences consumers’ willingness to pay. Thus, a consumer’s familiarity or past experiences with a certain bet presentation may serve as a reference point or face value and may influence how they process that information. As a result, the first hypotheses are presented:

Hypothesis 1a: When presented with American odds, participants will report increased willingness to bet compared to fractional and decimal conditions

Hypothesis 1b: When presented with American odds, participants will report increased amount willing to bet compared to fractional and decimal conditions

The hypotheses propose that the face value effect of American odds will influence participants more than that of the fractional or decimal odds. Because American odds are presented in a base format (hundreds) that is significantly larger than decimal or fractional (single-digit base numbers), it is hypothesized that these odds will result in

participants being more willing to bet larger amounts, as they have been primed using American odds as a reference point.

Familiarity

Familiarity is a concept that has been widely examined within marketing and consumer behavior literature. A customer's familiarity with products and content has been shown to reflect both direct personal experience as well as indirect knowledge through exposure to advertising and marketing (Alba & Hutchinson, 1987). Additionally, with operationalizing familiarity, it is important to capture two distinct concepts: how much a person knows about a product and how much a person thinks they know about a product (Park & Lessig, 1981). Increased levels of familiarity can positively influence attitude formation and customer satisfaction (Bettman & Sujan, 1987; Kotler & Armstrong, 2007), while low levels of familiarity can lead to higher perceptions of risk associated with transactions (Black et al., 2002). Familiarity has also been examined in betting contexts. Griffiths (2007) showed that "Familiar[ity] has the capacity to induce a 'psycho-structural interaction' between the gambler and the betting activity [...] If themes are increasingly familiar, a gambler might be more likely to persevere through complexities" (p.72). In the current context, the potential conversion math could be considered the complexity to persevere through. By also collecting implied probability, it will allow to see if more experience bettors have a more realistic assessment of the potential for winning. As a result, increased familiarity with a bet presentation format is expected to lead to increased willingness to bet within this context.

Hypothesis 2a: Increased familiarity with sports betting presentation format will result in increased willingness to bet.

Hypothesis 2b: Increased familiarity with sports betting presentation format will result in increased amount willing to bet.

Heuristics

Numerical Cognition

For decades, researchers have examined the role of cognition with regards to mathematical situations. Groen and Parkman (1972) examined the processes that govern individual's mental solutions of math problems. Since then, other researchers have demonstrated support for a model of memory-retrieval for solutions to simple addition and multiplication problems, where individuals retrieve answers from long-term memory (Ashcraft, 1982). Numerical price cognition stems from the following assumption: a buyer's subjective judgement of the absolute magnitude of a price plays a significant role in purchase decisions (Thomas & Morwitz, 2007, 2009). Further, these subjective judgements are influenced by different heuristic cues. Research has demonstrated that anchoring effects are more likely to occur when individuals are using a currency they are unfamiliar with (Mussweiler & Englich, 2003). This research found that the more familiar individuals became with a currency, the more accurate they became in evaluating price judgements. This research has demonstrated that when math is required for attention, individuals rely on their previous experiences and knowledge of math.

However, individuals with limited confidence in their previous experiences, knowledge, or ability may experience math anxiety. Math anxiety is a common, negative emotion that has been shown to disrupt cognitive processes by negatively impacting working memory (Ashcraft, 2002). What has been found is that different individuals have

different levels of comfort or capability with mathematics. This differing level of ability with math has been defined as an individual's numeracy.

Numeracy

The concept of numeracy is the mathematical counterpart to the reading concept of literacy. Numeracy not only reflects one's ability to comprehend numbers, it also influences the processing of numerical and nonnumerical information (Peters, 2012). Individuals with higher levels of numeracy are less susceptible to the anchoring or framing effects of reference points; are less influenced by nonnumerical information; and have a greater sensitivity to numbers. Commonly, research for numeracy involves decision making outcomes, such as choices involving risk and evaluations of quality (Peters et al., 2006). Research has shown that less numerate individuals are more susceptible to competing, affective considerations. One such study found when participants were asked to choose which they felt more confident in when given a choice of either a 9 out of 100 or 1 out of 10, less numerate individuals were more likely to make the suboptimal choice, selecting the first option (Peters et al., 2006). Another study showed that less numerate participants were more likely to make decisions based off their current mood when faced with lottery participation choices (Vastfjall, Peters, & Starmer, 2011). What is unknown is how numeracy influences individuals in sports betting scenarios, where numerical and nonnumerical information are present.

Because of the mathematical computations required, it is important to note the varying degrees of difficulty associated with different computations. Research has noted that "Fractions are one of the more difficult topics in elementary arithmetic; much of this difficulty is attributable to the complex relationships among the meanings and

representations of fractions and basic arithmetic operations” (Leinhardt & Smith, 1985, p.1). Research examining multiplication has shown that the level of difficulty varies based upon the complexity of the multiplication required. Simple equations such as 2×4 often do not require cognitive processing, while more difficult problems such as 7×16 require a deeper level of cognitive processing (Dansereau & Gregg, 1966). As a result, it appears that the more difficult the math required is to calculate odds, the more of a negative reaction those with low numeracy will exhibit.

Currently, researchers tend to only utilize either objective or subjective measures of numeracy in their studies, and limited research has utilized both measures of numeracy when examining participants. However, Rolison et al., (2020) utilized both measures in a mediation analysis examining how these variables factor into health risk comprehension. In the two conducted studies, the researchers found a correlation between objective general numeracy and subjective numeracy at .52 and .42 levels – implying the two variables are not highly correlated and should be treated as distinctly different. Due to this difference, the current study will utilize subjective numeracy in analysis. Subjective numeracy was chosen over objective numeracy for multiple reasons. First, utilizing a subjective measure is consistent with the other variables of interest in this study. Second, the effects of math anxiety are more likely to be based off an individual’s subjective numeracy – an individual can think they are bad at math, while not actually struggling with objective questions. As a result, the next hypotheses are presented:

Hypothesis 3a: Numeracy will partially mediate the relationship between familiarity and willingness to bet.

Hypothesis 3b: Numeracy will partially mediate the relationship between familiarity and amount willing to bet.

While numeracy is hypothesized to partially influence consumer's appraisals and subsequently their actions, there remains the possibility that consumers are putting limited cognitive effort to the math of the bets they are placing. As such, it is important to examine other possible heuristic effects which have been found to influence cognitive processing. In the context of sports betting, team identification provides a measure of personal importance that would influence an individual's appraisal.

Sport Management & Team Identification

Within the sport management literature, research examining consumer behavior in U.S. sports betting itself is sparse due to its very recent legalization. One study found that the most important relationship when investigating betting and fantasy sports was simply the decision to participate or not (Mahan, Drayer, & Sparvero, 2012). Other work investigated the decision to play daily fantasy sports, finding that personality, cognitive strategy, situational expectancy, and normative beliefs all play key roles in the decision making process (Dwyer, Drayer, & Shapiro, 2019). Similar research has found that consumer's familiarity and interest in sport may induce increased likelihood to engage in a sports lottery or boost their level of confidence in selects made (Li et al., 2012). One of the most relevant studies to this current context found that consumers who gamble on sporting events were more likely to overestimate their favorite teams' chances of winning (Na, Su, & Kunkel, 2019). This study did not provide the actual odds of the match, rather giving app users the ability to select which team would win a head-to-head matchup. This

finding highlights how a cognitive appraisal can influence the emotional responses which influence sports betting behavior.

Team identification is conceptualized as a fan's level of attachment towards their favorite team. Research has demonstrated that team identification functions as a heuristic for highly identified fans (Madrigal, 2001). For example, highly identified fans have more biased predictions (towards their favorite team) of the point difference of the game based off a written description of the results (Wann et al., 2006). Additionally, these fans are more likely to exhibit coping strategies such as attributing failures by their team to external factors such as bad luck or the match being poorly officiated (Madrigal & Chen, 2008). While highly identified fans also have more sport-related knowledge than low identified fans, they are also more likely to exhibit loyalty bias which influences their perception of matchups (Wann & Branscombe, 1995). In prediction scenarios such as sports betting, team identification plays a significant role in how the future of the event is appraised, potentially functioning as a cognitive distortion.

One important finding regarding team identification is the link between the concept and an individual's emotions. One such study found that individuals with higher levels of team identification reported an increase in frequency of positive emotions as well as team identification acting as a buffer against negative emotions such as depression or alienation (Branscombe & Wann, 1991). Prior research has shown a correlation between the cognitive antecedent of team identification onto subsequent affective states. One such study found that team identification has a dominant influence on affect (Madrigal, 1995). Team identification is a cognitive construct that influences an individual's affect based upon the result. Other research examining cognitive processing

and team identification found that highly identified fans allocate more cognitive resources and exhibit more adverse reactions to negative information regarding sport news (Potter & Keene, 2012). These findings support the notion that team identification functions as a heuristic cue that influences cognitive processing, emotion, and perception.

The link between team identification and purchase intention has also been demonstrated. One such example found that out of a sample of attendees of a college football game, more favorable purchase intentions were correlated with increases in levels of team identification (Madrigal, 2000). Oliver and Swan (1989) presented a theoretical framework in which a purchase outcome leads to both generalized state of affect and specific emotional reactions. Specifically, affect has been proven as an antecedent to satisfaction. These satisfaction judgments about consumption experiences are a form of secondary appraisal, where the individual makes cognitive evaluations which influence the emotional responses. As a result, the following hypotheses are presented:

Hypothesis 4a: Team Identification will partially mediate the relationship between familiarity and willingness to bet.

Hypothesis 4b: Team Identification will partially mediate the relationship familiarity and amounts willing to bet.

Team identification is hypothesized to influence consumer's willingness to bet and the amount they are willing to bet. Previous literature has shown that team identification plays a role in both the way consumers appraise his or her favorite team, as well as influencing multiple consumption behaviors. As such, it is hypothesized that team identification will function as a heuristic cue to sports gamblers and mediate the

relationship between bet presentation format and willingness to bet and amount willing to bet. This relationship leads to the final hypothesized relationships:

Hypothesis 5a: Numeracy will partially mediate the relationship between familiarity and Team Identification onto willingness to bet.

Hypothesis 5b: Numeracy will partially mediate the relationship between familiarity and Team Identification onto amount willing to bet.

Research Summary

This research highlights the need to address the role of consumer's cognitive appraisals and biases and how emotional responses influence the appraisal of sports betting odds and the subsequent willingness to bet. Sports betting is an industry that already generates billions of dollars and will only increase as more states legalize sports betting within the United States. When consumers encounter sports betting odds, a variety of different factors influence both the numerical and nonnumerical information that is processed – which teams are involved, who is the home or away team, what is the point spread, what are the odds being offered. Different consumers will have different levels of familiarity with each aspect, which will in turn affect the way they engage with a potential bet. The way participants cognitively appraise a potential bet will influence their emotional responses, which can direct behavior. Within a sports bet, there are multiple opportunities of appraisal, both mathematical and based off of teams involved. Furthermore, the process of sports betting includes multiple opportunities to make decisions such as the choice to bet or not, which team or player to bet on, and how much money should be wagered, to name a few.

This research will contribute to the fields of sport management and numerical cognition. Within sport management, an understanding of how team identification influences sport betting behavior can be attained. While within numerical cognition, the role of numeracy with sports betting scenarios can be garnered. By gaining an understanding of how consumers process these differences in numerical presentation recommendations can be made to multiple parties. First, this research can help protect consumers from the potential negative aspects of betting. Sportsbooks can utilize the gathered knowledge to provide bets that induce the largest amount of action and governments could use this to potentially enact restrictions in the name of consumer protection. Theoretically, the findings of this research can help contribute back to team identification and numeracy.

Hypotheses and Research Model

The following hypotheses will be tested utilizing an experimental design:

Hypothesis 1a: When presented with American odds, participants will report increased willingness to bet compared to fractional and decimal conditions

Hypothesis 1b: When presented with American odds, participants will report increased amount willing to bet compared to fractional and decimal conditions

Hypothesis 2a: Increased familiarity with sports betting presentation format will result in increased willingness to bet.

Hypothesis 2b: Increased familiarity with sports betting presentation format will result in increased amount willing to bet.

Hypothesis 3a: Numeracy will partially mediate the relationship between familiarity and willingness to bet.

Hypothesis 3b: Numeracy will partially mediate the relationship between familiarity and amount willing to bet.

Hypothesis 4a: Team Identification will partially mediate the relationship between familiarity and willingness to bet.

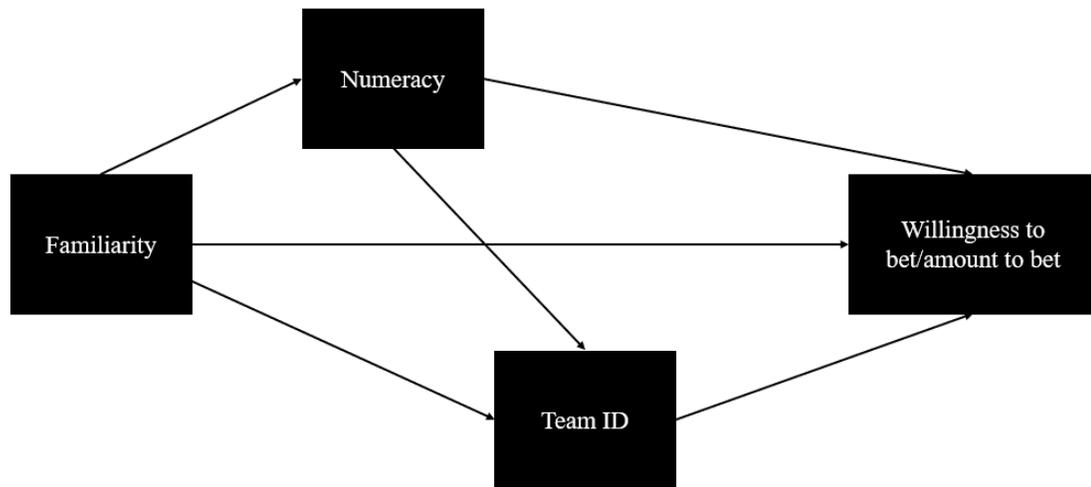
Hypothesis 4b: Team Identification will partially mediate the relationship familiarity and amounts willing to bet.

Hypothesis 5a: Numeracy will partially mediate the relationship between familiarity and Team Identification onto willingness to bet.

Hypothesis 5b: Numeracy will partially mediate the relationship between familiarity and Team Identification onto amount willing to bet.

Based upon these hypotheses, the following research model is proposed:

Figure 1



Conceptual Model

The proposed model suggests the following relationships. First, there is a hypothesized direct effect between familiarity with bet presentation format and both willingness to bet and amount willing to bet. High levels of numeracy and team identification are anticipated to correlate with increases in willingness to bet and amounts willing to bet. Specifically, numeracy and team identification are both hypothesized to partially mediate the main effect. The final hypothesized relationship is that of serial mediation where numeracy will mediate team identification's effect onto willingness to bet and amount willing to bet.

CHAPTER FOUR

METHOD

The focal purpose of this research was to utilize the lens of appraisal theory to examine how cognitive appraisals and emotional responses influence sports betting behavior through an experiment. The Latin square experiment was designed in a manner to allow for testing of all proposed hypotheses. To ensure validity and reliability, a multi-phase approach to the research project was utilized. The first phase involved pilot testing of the experiment itself. After the data was examined to ensure the experiment ran as intended, the final experiment was distributed to participants. Participants for the pilot testing were recruited from Amazon Mechanical Turk, and the final data collection was conducted using a Qualtrics Data Panel. One of the primary advantages of utilizing Qualtrics is the ability to specifically recruit participants of similar demographic background from different locations to all participate in the same experiment. This facilitates less variance when collecting data compared to a convenience sample.

Manipulations

Bet Presentation Format

One primary goal of this research was to examine the potential effects that the bet presentation format itself has on consumer behavior. Thus, it is necessary to utilize the different conditions (American, Fractional, and Decimal) as the primary manipulation of the study. As such, the different bet formats (American, decimal, and fractional) as well as the order they were viewed (American first, decimal first, fractional first) by participants have been coded into variables to segment these groups. Participants from the United States were shown an NFL matchup, the UK participants an EPL match, and

Australians an Aussie Rules Football match. This allows for examination based by the different bet format or based upon the order the odds were seen, providing a deeper level of analysis.

Independent Variables

Betting Familiarity

A set of questions was posed to participants to assess their level of familiarity with not just sports betting, but with each specific format of odds presentation. The first four questions utilized a 7-point Likert scale from “Not at all familiar” to “extremely familiar.” Items used were: “How familiar are you with sports betting?”; “How familiar are you with American betting odds?”; “How familiar are you with decimal betting odds?”; “How familiar are you with fractional betting odds?” These responses were summed and averaged to form a composite familiarity score, which had a Cronbach’s alpha of .90, indicating strong reliability. Additionally, questions were asked to determine which types of betting participants are familiar with as well. Specifically, “Which types of bets have you engaged in?” was asked with the following options available, “Sports betting, horse betting, lotteries, poker, casino games, bingo, or EGM (electronic gaming machines)” taken from Binde et al., (2017).

Numeracy

Another variable of interest was that of numeracy, which was operationalized utilizing the eight-item subjective numeracy scale (Fagerlin et al., 2007). The subjective numeracy scale does not rely on mathematical computations, but rather asks participants to self-report levels of comfort with different calculations or how they view information presented in mathematical formats. As the other variables of familiarity and team

identification were asked subjectively, for the purpose of consistency, numeracy was also collected in a subjective manner. The 8-item scale questions were combined with a mean providing the overall subjective numeracy. This scale received a Cronbach's alpha of .93. This scale has been validated and shown to predict comprehension of risk (Rolison et al., 2020). As such, the subjective numeracy scale is appropriate for use in the current context and can be seen in the attached appendix.

Team Identification

The second hypothesized psychological variable was that of Team ID. Team ID has been defined as the level of psychological attachment felt by sports fans towards his or her favorite team (Wann et al., 2001). A 3-item unidimensional team identification scale will be utilized to assess the level of participants adopted from The Team Identification Scale developed by Kwon and Armstrong (2004). The items were "When someone criticizes [team] it feels like a personal insult," "When [team] loses a game, it feels like a personal failure," and "I feel a sense of ownership for [team] rather than just being a fan of [team]. In the current research, participants from the US were asked about their team ID towards the Dallas Cowboys, those from the UK asked about Manchester United and those in Australia towards the Sydney Swans. In each context, spectator sports teams with large fanbases were targeted to attempt and attract a wide range team identification among participants.

Internal Validity Checks

Comprehension

Two comprehension questions were posed to participants ranging from "which team must win for your bet to be successful" to "what would the payout for your bet be if

you wagered X amount of money? (shown in the various formats)” after each stimuli.

These questions will be utilized to see if there is a correlation between bet comprehension, numeracy, and their behavior.

Implied Probabilities

To ensure internal validity for objective numeracy within a sports betting context, it is important to capture participants’ math abilities directly for this context. As such, implied probabilities and comprehension of payouts will be collected. To determine comprehension of payout, participants were asked what the payout of a hypothetical bet would be. Implied probabilities refer to the association between betting odds and the likelihood it will convey. To calculate implied probabilities, the following equations are needed:

For American odds (underdog): $100 / (\text{positive American odds} + 100) * 100 = \text{implied probability}$

$$\text{Example: } 100 / (200 + 100) * 100 = 33.33\%$$

For decimal odds: $(1/\text{Provided odds}) * 100 = \text{implied probability}$

$$\text{Example: } (1/3.0) * 100 = 33.33\%$$

For fractional odds: $\text{denominator} / (\text{denominator} + \text{numerator}) * 100 = \text{implied probability}$

$$\text{Example: } 1 / (1 + 2) * 100 = 33.33\%$$

Dependent Variables

This research relied on two primary dependent variables to conduct the necessary analysis.

Willingness to Bet

The first dependent variable of interest is willingness to bet. The current study adopted the measures for willingness to buy from multiple studies (Siegrist, Stampfli, Kastenholtz, 2007; Swami, Chamorro-Premusiz, & Furnham, 2009; and Rebollar et al., 2012). These studies all utilized a single item measure asking “What is your willingness to buy (item of focus of study)?” which respondents answered utilizing Likert scales. Willingness to bet was measured using a single question on a 0-100 slider asking, “How likely are you to have made the wager you just saw?”

Amount Willing to Bet

Additionally, we capture the amount consumers are willing to bet by adapting Donaldson et al.’s (1997) willingness to pay measure. The current study utilized a drop-down menu with \$0-200 in ten-dollar increments for participants to select in response to the question “How much are you willing to bet?” Prior to exposure to each stimulus, participants were informed they had a \$200 budget with which to place bets. Because data were collected from the United States, Australia, and the United Kingdom, the native currency was utilized for their experiment. Once the data were collected, the amounts were converted and standardized around the USD. By utilizing this approach to collect amount willing to bet, we can directly compare between different conditions across contexts.

Procedures

To test the proposed hypotheses, a randomized 3x3 Latin square experimental design will be utilized. The Latin square design allows for each treatment or manipulation to be seen the same number of times, by the same number of subjects, but in different

orders which can remove any potential unintended variance. The Latin square design is ideal for an experiment in which you could potentially measure each subject's response in each possible experimental condition, while controlling for the fact that each participant is biased as the experiment continues (Smelser & Baltes, 2001). The first condition will involve the different bet presentations (American, fractional, or decimal) shown to participants, while the second condition will refer to the geographical location of recruited participants (United States, United Kingdom, and Australia). These locations were selected for multiple reasons. First, residents of each location speak English, which eliminates the need for translation. Second, each location uses a different format for sports betting: The United States uses American odds, the United Kingdom utilizes fractional odds, and Australia uses decimal odds. Due to recruiting internationally, necessary adjustments to the experiment were made to account for the cultural differences (changing NFL teams to Premier League or Aussie Rules Football, asking questions in native currencies).

The benefit of a Latin square design is the ability to account for randomness or nuisance variables based upon the order participants view different stimuli. This allows for a higher level of both internal and external validity, without compromising the procedure. Thus, each participant in the experiment will view hypothetical bets from each bet presentation format. The order will be randomized across participants, allowing analysis to determine if the order in which bets are presented influences consumer's willingness to bet and amount willing to bet. Further, this method also accounts for the potential biases associated with familiarity of the local bet format. Table 1 is an example of how the presentation will differ between participants.

Table 1

Example of Bet Presentation by Condition

Group A	Group B	Group C
American Odds	Fractional Odds	Decimal Odds
Decimal Odds	American Odds	Fractional Odds
Fractional Odds	Decimal Odds	American Odds

By providing different participants with a different order of bets, the effects of priming or any unforeseen nuisance variables can be accounted for.

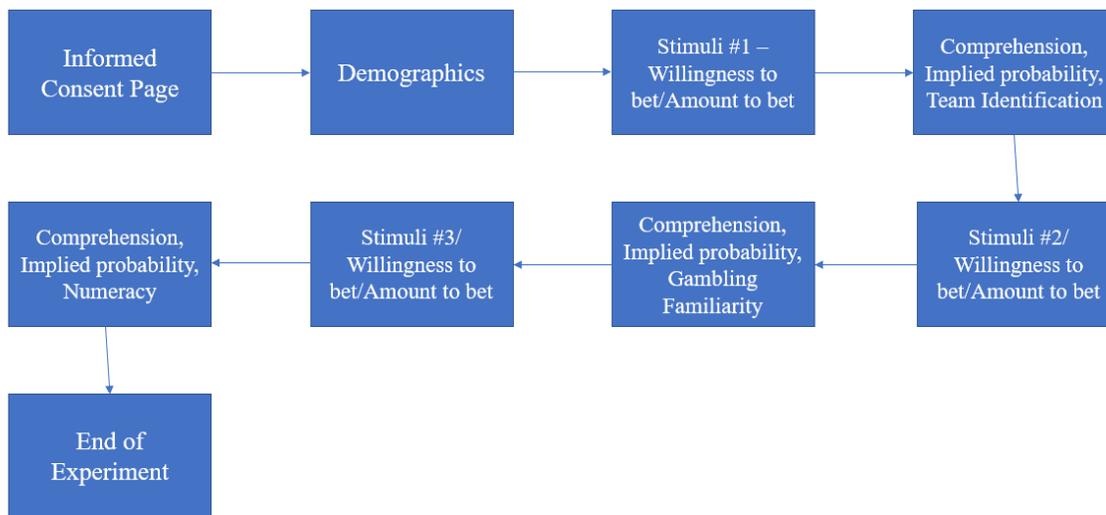
The experiment was conducted as follows. After participants voluntarily opted-in, they are asked to provide demographic information and indicate the country in which they reside – the United States, United Kingdom, or Australia. Participants not residing in these countries or who were under the age of 21 were excluded from the experiment.

The answer to which country the individual resided then randomly assigned the participant to one of the three conditions for their country. Participants were presented with a hypothetical bet shown in one set of odds. In the United States, participants were asked to bet on the Dallas Cowboys, in the UK – on Manchester United, and in Australia – on the Sydney Swans. Following exposure to the stimulus, willingness to bet and amount willing to bet were collected along with comprehension and implied probability and team identification. Team ID was asked regarding the team that participants were asked to bet on – the Dallas Cowboys, Manchester United, and Sydney Swans. After which, the second stimulus was presented – the same bet was shown using different odds. Following the second stimulus, betting familiarity was collected – assessing both familiarity with sports betting on a Likert scale, but also with different forms of betting –

such as horse racing, table games, lotteries, etc. After which the third and final stimulus was presented, followed by collection of the subjective numeracy scale. By separating when the independent variables were collected, potential biasing influences were limited.

An experiment map can be seen below:

Figure 2:



Experiment Map

Analysis

Pilot Test

Before launching the final experiment, pilot data was collected utilizing Amazon Mechanical Turk to recruit 215 participants from the United States, United Kingdom, and Australia. Both the US and UK had 100 participants each, while only 15 were able to be recruited from Australia. As a result, the final data collection was conducted through Qualtrics to better reach the three target geographical locations. The pilot data was analyzed to ensure the experiment ran smoothly and that all the independent and dependent variables were valid and reliable.

Mean values of both willingness to bet and amount willing to bet from the pilot data can be seen in Tables 2 and 3, which show that when presented with American odds first, participants reported higher willingness to bet across all subsequent conditions. When participants from the UK were presented with the native fractional odds first, there was no effect from the American odds seen. On the other hand, American participants reported their highest amount willing to bet on the American presentation when it followed the other formats. This pretest provided enough evidence that the influence of bet presentation would be significant. No changes were made based upon the results of the pilot testing.

Table 2

USA Results

Group A	Group B	Group C
American Odds \$7.5 \$WTB / 68.6 WTB	Fractional Odds \$8.2 \$WTB / 67.7 WTB	Decimal Odds \$7.2 \$WTB / 69.9 WTB
Decimal Odds \$6.9 \$WTB / 62.7 WTB	American Odds \$9.4 \$WTB / 64.7 WTB	Fractional Odds \$7.5 \$WTB / 67.4 WTB
Fractional Odds \$7.3 \$WTB / 67.1 WTB	Decimal Odds \$7.9 \$WTB / 67.3 WTB	American Odds \$8.4 \$WTB / 62.2 WTB

Note: \$WTB = Amount willing to bet, WTB = Willingness to bet

Table 3

UK Results

Group A	Group B	Group C

American Odds \$9.6 \$WTB / 72.4 WTB	Fractional Odds \$7.9 \$WTB / 72.8 WTB	Decimal Odds \$8.2 \$WTB / 65.7 WTB
Decimal Odds \$7.7 \$WTB / 63.9 WTB	American Odds \$8.8 \$WTB / 58.8 WTB	Fractional Odds \$7.3 \$WTB / 60.8 WTB
Fractional Odds \$7.0 \$WTB / 61.6 WTB	Decimal Odds \$7.2 \$WTB / 58.5 WTB	American Odds \$6.7 \$WTB / 54.8 WTB

Note: \$WTB = Amount willing to bet, WTB = Willingness to bet

Participants

Qualtrics Data Panel was used to recruit 600 participants from the United States, the United Kingdom, and Australia. The only screening criterion was for participants to be over the age of 21. Qualtrics also screened out respondents who failed any one of the three attention check questions. Additionally, participants who did not finish the experiment were not included with the final dataset. Due to an error in sampling on the part of Qualtrics, 705 total participants were recruited and used as the final respondents.

The demographical breakdown of the final sample was nearly 53% female, 47% male, and <1% other. Regarding education, 20% of respondents reported their highest level of education as high school, 19% reported some college education, 30% completed a 4-year university or college, and 16% reported having an advanced degree (MBA, JD, PhD, etc.). In terms of race, 85% of respondents were white, with 4% Black, 2% Hispanic, 2% Native, 2% other, with less than 1% Pacific Islander. The average income of respondents was reported to be between \$60,000–80,000 USD per year, whereas 19.4% of respondents reported earning over \$100,000 USD per year. The only statistically significant demographic variable between countries was the age of

participants. Participants from the United States were an average of 52.4 years old, from the United Kingdom were 38.5 years old, and from Australia were 45.5 years old. The total average age of participants was 45.4 years old. These results fall in line with how generally sport fans demographics break down. According to a report by IPG Media Lab, the average NFL fan was 48.9 years old and tended to be male (58%). Similar to the demographics of the current sample, 27% of participants reported income over \$75,000. These demographic results can be seen in Table 4.

Table 4

Participant Descriptive Statistics

	USA	UK	AUS	Total
Gender				
Male	38.5%	42%	60.2%	46.9%
Female	60.8%	57.5%	39.8%	52.7%
Other	0.4%	0.5%	0%	0.1%
Age	52.3	38.5	45.2	45.4%
Education				
High School	20%	21%	23.5%	20.4%
Some College	22.6%	17.8%	15.4%	18.7%
4-year College	25.3%	22.8%	37.1%	29.9%
Advanced Degree	17.8%	19%	9.6%	16.3%
Race				
White	81.9%	87.2%	84.6%	84.5%
Black	7.5%	4.6%	0.5%	3.8%
Hispanic	4.9%	0.9%	0.0%	2.8%
Asian	3.8%	6.4%	7.2%	6.4%
Native	0.8%	0.5%	4.1%	1.5%
Pacific Islander	0.4%	0.0%	0.0%	0%
Other	0.8%	0.5%	3.6%	1%
Income				
\$0-\$40,000	40%	45.7%	24%	36.7%
\$40,001-\$80,000	28%	32.8%	26.8%	28.8%
\$80,001-\$120,000	18.9%	13.2%	18.5%	17%
\$120,000+	11.6%	7.3%	29%	17.4%

The final sample included 266 participants from the United States, 219 from the United Kingdom, and 220 from Australia totaling 705 participants. Within these samples, participants were broken up into one of three groups based on location to fulfill the Latin square design. An error in sampling on the part of Qualtrics resulted in more participants recruited from the United States. The breakdown of participants by condition can be seen in Table 5.

Table 5

Number of Participants Per Condition

USA Condition 1 87	USA Condition 2 85	USA Condition 3 94
UK Condition 1 71	UK Condition 2 74	UK Condition 3 74
AUS Condition 1 76	AUS Condition 2 73	AUS Condition 3 71

The results of Table 6 display betting familiarity and with different odds, as well as numeracy and team identification by participant's country. Table 1 presents the means of betting familiarity with the three different formats, as well as betting in general. Further, the general and subjective numeracy as well as team ID means are provided. Oddly enough, participants from the USA had the lowest familiarity with American betting odds, whereas the UK had the highest familiarity with fractional odds and Australia had the highest familiarity with decimal odds. Overall, Americans are significantly less familiar with sports betting in general than the participants from the UK and Australia. Participants in Australia self-reported the highest subjective numeracy scores.

Table 6

Descriptive Statistics by Country

	USA	UK	AUS	Total
Composite				
Familiarity (1-7)	2.83	3.56	3.54	3.28
Betting Familiarity	2.83	3.91	3.90	3.50
Familiarity American	2.63	2.75	2.94	2.76
Familiarity Fractional	3.09	4.09	3.61	3.57
Familiarity Decimal	2.78	3.47	3.71	3.29
Numeracy Scale (1-7)	4.43	4.38	4.59	4.46
Team ID (1-7)	2.93	3.28	3.35	3.17

Table 7 shows a correlation table of all primary variables is included to ensure internal validity within all of relevant constructs with the mean values and standard deviations.

Table 7

Correlation Table

	Means	Standard Deviations	N	\$WTB	WTB	FAM	TID	SNS
Amount Willing to Bet	7.94	6.028	704	1				
Willingness to Bet	53.21	30.511	704	.403**	1			
Familiarity	3.28	2.140	704	.192**	.460**	1		
Team ID	3.17	2.055	704	.237**	.446**	.494**	1	
Numeracy	4.46	1.512	695	.172**	.275**	.466**	.260**	1

Note: \$WTB = Amount willing to bet, WTB = Willingness to bet, FAM = Familiarity, TID = Team Identification, SNS = Subjective Numeracy

** . Correlation is significant at the $p < .01$ level (2-tailed).

Data Collection

Data were collected by Qualtrics Data Panel beginning on March 30, 2021 and completed on April 12, 2021.

Data Analysis

Prior to analyzing the data, validity and reliability measures were examined once again on the final data set. The three-item team identification scale (Kwon & Armstrong, 2004) had a Cronbach's alpha of .90. The eight-item subjective numeracy scale (SNS) (Fagerlin et al., 2007) was deemed reliable with a Cronbach's alpha of .93. The four items that were used to assess familiarity with sports betting were deemed reliable with a Cronbach's alpha of .89. The dependent measures of willingness to bet and amount willing to bet were moderately correlated with a Pearson Correlation coefficient of .40.

Variance among groups was tested and while certain groups reported no issues, a few conditions had significantly different variance – specifically relating to post-hoc analysis of Team ID. As such, Tamhane's T2 post-hoc testing, which is a conservative pairwise comparison appropriate when variances are uneven (IBM), was conducted to reduce the possibility of Type I errors occurring. The remaining groups utilized Bonferroni post-hoc testing.

To analyze the data Hayes Process Macro Model 6 was used to test a multiple mediation model that was hypothesized. Additional analysis of variance (ANOVA) was conducted to test for specific group differences between variables and for post-hoc testing of potential differences. See Figure 3 for the analytic plan by hypothesis.

Table 8

Analytic Plan		
	Hypothesis	Analysis
1a	<i>Increased familiarity with sports betting presentation format will result in increased willingness to bet.</i>	Hayes Process Macro #6 - Multiple Serial Mediation
1b	<i>Increased familiarity with sports betting presentation format will result in increased amount willing to bet.</i>	Hayes Process Macro #6 - Multiple Serial Mediation
2a	<i>Subjective numeracy will partially mediate the relationship between familiarity and willingness to bet.</i>	Hayes Process Macro #6 - Multiple Serial Mediation
2b	<i>Subjective numeracy will partially mediate the relationship between familiarity and amount willing to bet.</i>	Hayes Process Macro #6 - Multiple Serial Mediation
3a	<i>Team Identification will partially mediate the relationship between familiarity and willingness to bet.</i>	Hayes Process Macro #6 - Multiple Serial Mediation
3b	<i>Team Identification will partially mediate the relationship between familiarity and amount willing to bet.</i>	Hayes Process Macro #6 - Multiple Serial Mediation
4a	<i>Subjective numeracy will partially mediate the relationship between familiarity and Team Identification onto willingness to bet.</i>	Hayes Process Macro #6 - Multiple Serial Mediation
4b	<i>Subjective numeracy will partially mediate the relationship between familiarity and Team Identification onto amount willing to bet.</i>	Hayes Process Macro #6 - Multiple Serial Mediation

CHAPTER FIVE

RESULTS

After testing the hypotheses regarding the model, the descriptive statistics of willingness to bet and amount willing to bet were examined for the three Latin square conditions: 1) American odds, fractional odds, decimal odds; 2) Fractional odds, decimal odds, American odds; 3) Decimal odds, American odds, fractional odds. The differences between conditions can be found in Tables 9 and 10.

The results show that when presented with American odds, participants reported a significantly higher amount willing to bet when compared to fractional odds, and a mean difference when compared to decimal odds, though that relationship was not significant. There was no significant difference between any condition on willingness to bet. Furthermore, when presented with American odds first, the subsequent conditions (decimal and fractional) were significantly higher than in the other Latin square conditions.

Table 9
Between- and Within-subject Analysis

	USA1	USA2	USA3	UK 1	UK 2	UK 3	AUS1	AUS2	AUS3
Willingness to bet									
Between-subjects	54.59	54.17	52.29	53.52	56.49	54.48	48.88	51.07	52.72
Within-subjects	47.11	57.98	55.96	56.54	52.97	54.98	60.44	40.02	52.21
Amount to bet									
Between-subjects	8.780	8.270	8.153	7.207	6.163	6.050	7.867	8.083	8.083
Within-subjects	8.183	8.570	8.450	7.107	6.287	6.027	10.810	5.007	8.217

*1 indicates condition order American, fractional, decimal

*2 indicates condition order fractional, decimal, American

*3 indicates condition order decimal, American, fractional

Table 9 provides the results of both the between- and within-subject analysis for willingness to bet and amount willing to bet. For the between-subjects analysis, there is no significant difference on the willingness to bet between any of the relevant conditions. Regarding the amount to bet, there are significant differences in the USA and UK conditions that saw American odds first, but not the Australian group. Regarding the within-subject analysis, there were significant differences within two of the geographic groups. In the USA, participants who saw American odds first reported the lowest levels of willingness to bet and amount willing to bet compared to the other conditions. In Australia, participants who saw American odds first reported the highest willingness to bet as well as the largest amount willing to bet. In the UK, while there was no significant difference in willingness to bet, participants who saw American odds first reported the highest amount willing to bet. As a result of these conflicting results, H1a (*When presented with American odds, participants will report increased willingness to bet compared to fractional and decimal conditions*) and H1b: (*When presented with American odds, participants will report increased amount willing to bet compared to fractional and decimal conditions*) are rejected.

Table 10
Means of Dependent Variable Output by Experiment Condition

	USA 1	USA 2	USA 3	UK 1	UK 2	UK 3	AUS 1	AUS 2	AUS 3
Means of willingness to bet (0-100)									
American	46.44	61.25	56.09	54.66	52.24	53.68	59.59	36.64	50.43
Fractional	48.67	56.6	57.25	55.9	53.5	60.08	60.59	41.86	50.76
Decimal	46.23	56.09	54.56	59.06	53.18	51.2	61.14	41.56	55.46
Means of amount to bet (0-20)									
American	8.16	9.08	9.1	12.01	9.36	8.89	8.44	3.4	6.56
Fractional	8.33	8.45	8.03	9.09	8.36	8.44	8.57	4.35	5.99
Decimal	8.06	8.18	8.22	8.75	8.68	7.98	8.28	3.96	6.67

*Green cells indicate which condition was shown first, blue indicates the second condition, while yellow indicates the final condition shown.

For Table 10, the mean values for willingness to bet are based on a 0-100 scale, which measured how willing the participant would be to engage in the bet. 100 indicated absolute certainty of participation while 0 indicates absolutely no interest in placing the bet. The values for amount to bet represent a range of how much money an individual would invest. For example, 0 would indicate the participant did not want to put any money down, a 1 would indicate between \$1-9 dollars. The largest mean value is a 12, which would represent between \$110-119 bet. While all dollar values were asked to participants based on their native currency, the results have all been converted to USD for easier comparison. For the UK and AUS conditions, it can be seen how participants reported significantly higher amounts willing to bet when presented with American odds first.

Hypotheses 2a and 2b proposed a positive, significant relationship between familiarity with betting and the format on willingness to bet and amount willing to bet. These results can be seen in Figures 4 and 5. These graphs both display a clear, consistent correlation between familiarity with gambling and willingness and amount willing to bet. Specifically, those who indicated the lowest level of familiarity reported betting the overall lowest amount, \$61-\$69, and reported the lowest levels of willingness to bet at approximately 40. On the other hand, those who indicated the highest level of familiarity reported betting around \$100 and a willingness to bet of nearly 75. As a result, H2a (*Increased familiarity with sports betting presentation format will result in increased willingness to bet*) and H2b (*Increased familiarity with sports betting presentation format will result in increased amount willing to bet*) are confirmed.

Figure 3

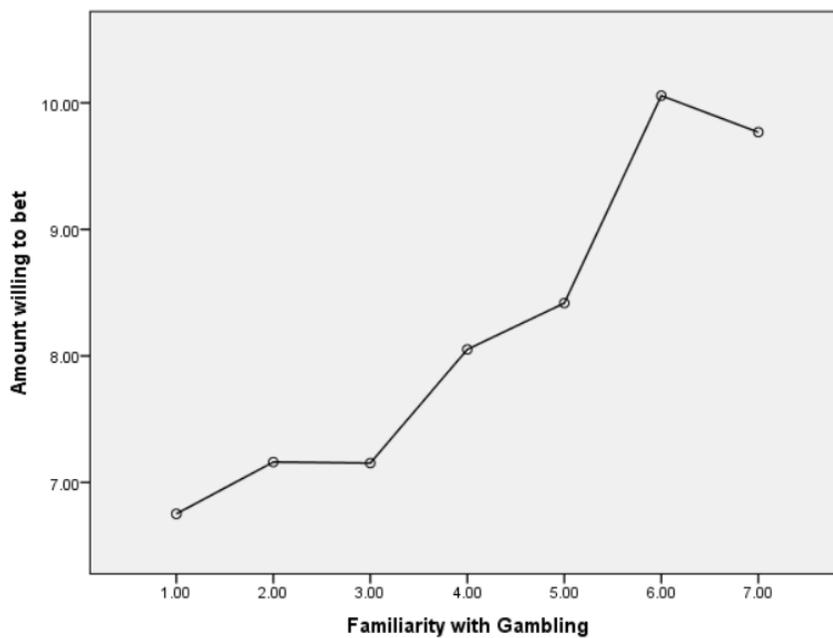
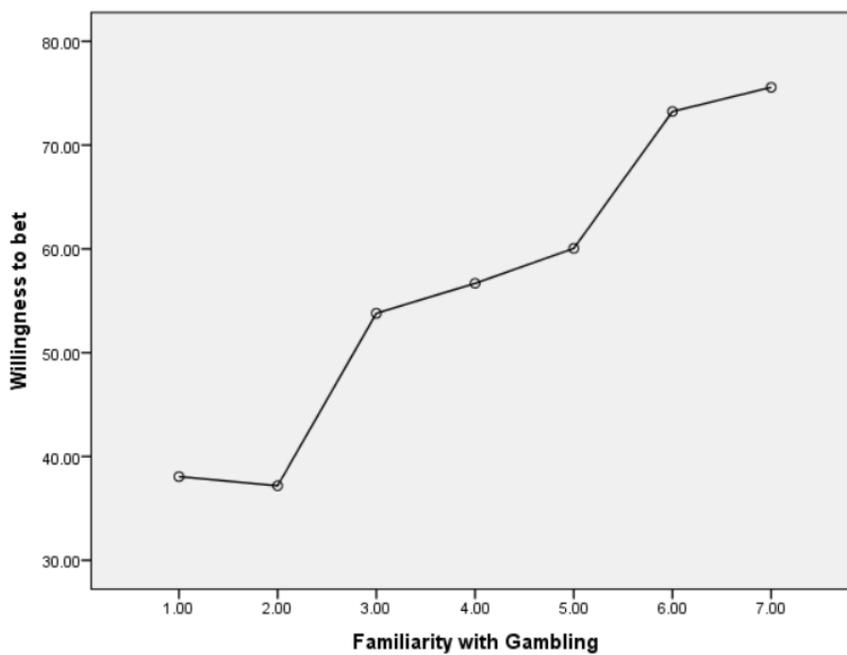
*Amount willing to bet with familiarity of gambling*

Figure 4

*Willingness to bet with familiarity of gambling*

Overall, those least familiar with sports betting (Mean: 38.06) were significantly ($p < .001$) less likely to be willing to bet rather than those who were most familiar (75.56). These differences were found across the whole sample, as well as based upon the geographic location of the U.S, UK, or Australia. Additionally, participants who were least familiar with betting were willing to bet a significantly smaller amount (6.75 or about \$67.50) than those who were most familiar (9.77 or about \$97.70). These differences were found among the whole sample, as well as based upon geographic location.

Post-hoc analysis between-subjects revealed a significant difference in the amount willing to bet between the conditions that were shown American odds first and fractional odds first. Table 11 presents the full post-hoc testing of multiple variables using the level of familiarity with gambling as the grouping variable. This table highlights the influence of familiarity with gambling on both willingness to bet and amount willing to bet. Counterintuitively, we see that the individuals most familiar with gambling also were also the further off of the correct implied probability (e.g. Familiarity - 7, Implied probability - 76.8).

Table 11

Familiarity with betting post-hoc testing							
Familiarity level	1 (Lowest)	2	3	4	5	6	7 (Highest)
N	208	75	72	94	96	74	84
Numeracy	3.58	4.50	4.23	4.37	4.69	5.57	5.72
Implied Probability	53.41	51.04	62.26	62.09	67.83	72.18	76.8
Willingness to Bet							
American	38.06	36.21	54.72	55.22	60.54	70.27	73.45
Fractional	38.23	40.61	51.93	57.87	61.94	74.45	75.64
Decimal	37.88	34.72	54.70	56.95	57.67	75.00	77.6

Amount to Bet							
American	7.21	7.34	7.99	8.58	8.90	10.15	10.08
Fractional	6.47	7.23	7.18	7.75	8.82	10.10	9.51
Decimal	6.57	6.91	6.28	7.83	8.13	9.92	9.71

Hypotheses 3a-5b were related to various forms of mediation involving team identification and numeracy. The results for each experimental condition can be seen below in Tables 12-17.

Table 12
Familiarity on Willingness to bet (American odds)

Direct effects	Coefficient	SE	<i>t</i>	<i>p</i>	Model R ²
Willingness to bet					0.2420
<i>Independent variable</i>					
Familiarity	4.7235	.8549	5.5255	0.0000	
<i>Mediators</i>					
Subjective Numeracy	.3241	.8851	.3662	0.7143	
Team Identification	4.4834	.6680	6.7118	0.0000	
<i>Indirect effects</i>	Effect	Boot SE	Boot LLCI	Boot ULCI	
Familiarity > Team ID > WTB	3.1998	.5895	2.0773	4.4358	
Familiarity > Numeracy > Team ID > WTB	-.2858	.1264	-.5644	-.0717	

Table 12 provides the results of the mediation analysis conducted using Hayes Process Macro #6, examining the results from the conditions which saw American odds for willingness to bet. Familiarity and Team ID had a significant direct effect. When examining mediation pathways, Team ID provided a positive, significant indirect effect onto willingness to bet. However, when numeracy was included with Team ID, the indirect effect becomes negative and significant. The confidence intervals do not cross over 0, indicating significance among all listed indirect effects.

Table 13 provides the results of the mediation analysis conducted using Hayes Process Macro #6, examining the results from the conditions which saw American odds for amount willing to bet. Within this model, only Team ID had a significant direct effect. Regarding indirect effects, team ID has a positive significant effect, while including numeracy and Team ID created a negative effect. The confidence intervals do not cross over 0, indicating significance among all listed indirect effects.

Table 13
Familiarity on Amount willing to bet (American odds)

Direct effects	Coefficient	SE	<i>t</i>	<i>p</i>	Model R ²
Amount willing to bet					0.0579
<i>Independent variable</i>					
Familiarity	0.0611	0.2063	0.2964	0.7670	
<i>Mediators</i>					
Subjective Numeracy	0.2103	0.2136	.9847	0.3251	
Team Identification	0.7494	0.1612	4.6491	0.0000	
<i>Indirect effects</i>	Effect	Boot SE	Boot LLCI	Boot ULCI	
Familiarity > Team ID > WTB\$	0.5348	0.1354	0.2687	0.7934	
Familiarity > Numeracy > Team ID > WTB\$	-0.0478	0.0223	-0.0975	-0.0103	

Table 14
Familiarity on Willingness to bet (Fractional odds)

Direct effects	Coefficient	SE	<i>t</i>	<i>p</i>	Model R ²
Willingness to bet					0.2340
<i>Independent variable</i>					
Familiarity	5.5381	.8458	6.5479	0.0000	
<i>Mediators</i>					
Subjective Numeracy	.7517	.8757	.8584	0.3910	
Team Identification	3.2067	.6609	4.8521	0.0000	
<i>Indirect effects</i>	Effect	Boot SE	Boot LLCI	Boot ULCI	
Familiarity > Team ID > WTB	2.2886	0.5270	1.2945	3.3447	
Familiarity > Numeracy > Team ID > WTB	-.2044	0.0960	-.4208	-.0451	

Table 14 provides the results of the mediation analysis conducted using Hayes Process Macro #6, examining the results from the conditions which saw fractional odds for willingness to bet. Within this model, both familiarity and Team ID had significant direct effects. When looking at indirect effects, Team ID once again has a positive, significant effect. However, when numeracy is added with Team ID into the model, the indirect effect becomes negative. The confidence intervals do not cross over 0, indicating significance among all listed indirect effects. Once again, the contrasting influences of team ID and numeracy are displayed.

Table 15 provides the results of the mediation analysis conducted using Hayes Process Macro #6, examining the results from the conditions which saw fractional odds for amount willing to bet. Within this model, familiarity, subjective numeracy, and Team ID had a significant direct effect. In this analysis, only Team ID had a significant indirect effect on the amount willing to bet. The confidence intervals do not cross over 0, indicating significance among all listed indirect effects.

Table 15
Familiarity on Amount willing to bet (fractional odds)

Direct effects	Coefficient	SE	<i>t</i>	<i>p</i>	Model R ²
Amount willing to bet <i>Independent variable</i>					0.0655
<i>Mediators</i>					
Familiarity	.4158	0.1855	2.2419	0.0253	
Subjective Numeracy	.3675	0.1920	1.9136	0.0561	
Team Identification	.3459	0.1449	2.3867	0.0173	
Indirect effects	Effect	Boot SE	Boot LLCI	Boot ULCI	
Familiarity > Team ID > WTB\$	0.2469	0.1237	0.0037	0.4949	

Table 16
Familiarity on Willingness to bet (decimal odds)

Direct effects	Coefficient	SE	<i>t</i>	<i>p</i>	Model R ²
Willingness to bet <i>Independent variable</i>					0.2346
<i>Mediators</i>					
Familiarity	5.1327	.8565	5.9925	0.0000	
Subjective Numeracy	.8313	.8868	.9374	0.3489	
Team Identification	3.7121	.6693	5.5463	0.0000	
Indirect effects	Effect	Boot SE	Boot LLCI	Boot ULCI	
Familiarity > Team ID > WTB	2.6493	.5604	1.6013	3.8047	
Familiarity > Numeracy > Team ID > WTB	-.2366	.1060	-.4716	-.0602	

Table 16 provides the results of the mediation analysis conducted using Hayes Process Macro #6, examining the results from the conditions which saw decimal odds for willingness to bet. Within this model, familiarity and Team ID had significant direct effects, while team ID also contributed to a positive, significant indirect effect. However, once again, when numeracy is added to the mediation with Team ID, the effect becomes negative. The confidence intervals do not cross over 0, indicating significance among all listed indirect effects.

Table 17 provides the results of the final mediation analysis conducted using Hayes Process Macro #6, examining the results from the conditions which saw decimal odds for amount willing to bet. Within this model, numeracy, Team ID and familiarity all provide significant direct effects. This model also had three significant indirect effect pathways. Both team ID and numeracy had positive significant indirect effects when tested alone. When numeracy was added to the serial mediation with Team ID, only then did the indirect effect become negative and significant. No confidence intervals crossed 0, indicating significant indirect effects.

Table 17
Familiarity on Amount willing to bet (decimal odds)

Direct effects	Coefficient	SE	<i>t</i>	<i>p</i>	Model R ²
Amount willing to bet					0.0726
<i>Independent variable</i>					
Familiarity	0.3379	0.1782	1.8959	0.0584	
<i>Mediators</i>					
Subjective Numeracy	0.3680	0.1845	1.9946	0.0465	
Team Identification	0.4380	0.1393	3.1455	0.0017	
<i>Indirect effects</i>	Effect	Boot SE	Boot LLCI	Boot ULCI	
Familiarity > Team ID > WTB\$.3126	.1181	.0770	.5460	
Familiarity > Numeracy > WTB\$.1659	.0833	.0019	.3228	
Familiarity > Numeracy > Team ID > WTB\$	-.0279	.0153	-.0635	-.0033	

The results indicate that numeracy was a significant mediator only in one of the conditions – decimal amount willing to bet. Practically, this effect appears as those with lower levels of numeracy (45.56) reported significantly ($p < .001$) less willingness to bet compared to those with higher levels of numeracy (59.45). This effect also appears as those with lower levels of numeracy (6.83 or \$68.30) reported significantly lower amounts willing to bet compared to individuals with higher levels of numeracy (8.88 or \$88.80). However, within each model tested, the significance of the effects of numeracy varied. As a result, H3a (*Numeracy will partially mediate the relationship between familiarity and willingness to bet*) and H3b (*Numeracy will partially mediate the relationship between familiarity and amount willing to bet*) are rejected. Post-hoc testing regarding subjective numeracy can be found in Tables 18.

Table 18
Numeracy Post-hoc

Subjective Numeracy Probability	1	2	3	4	5	6	7
N	30	49	87	158	168	135	67
Willingness to Bet							
American	33.27	49.45	47.09	46.37	49.36	63.13	68.4
Fractional	34.13	48.61	48.8	45.34	53.33	65.72	68.97
Decimal	33.13	48.14	46.64	45.98	51.68	64.62	70.61
Amount to Bet							
American	6.53	7.92	8.84	9.94	7.82	10.36	9.45
Fractional	5.72	6.19	7.35	6.15	7.91	9.85	9.41
Decimal	5.62	6.32	6.92	6.52	7.64	9.78	9.28

Hypotheses 4a and 4b examined the role of team identification as a mediator. Results from the mediation analysis show that team identification was a significant ($p < .001$), positive mediator across all experiment conditions. This effect resulted in participants low in team identification having significantly lower willingness to bet (46.37) compared to those with higher levels of team identification (71.19). Further, this effect resulted in those low in team identification had a 67% lower amount willing to bet (7.14 or \$71.40) compared to those with higher levels of team identification (10.25 or \$102.50). Full post-hoc analysis of team identification can be seen in Table 19. As a result, Hypothesis 4a (*Team Identification will partially mediate the relationship between bet presentation and willingness to bet*) and 4b (*Team Identification will partially mediate the relationship between bet presentation and amount willing to bet*) are confirmed.

Table 19
Team Identification Post-hoc

Team Identification	1	2	3	4	5	6	7
Subjective Numeracy	4.25	4.23	4.03	4.10	4.50	5.50	5.59
Implied Probability	53.94	55.48	61.10	62.60	65.73	76.36	82.10
N	261	60	67	120	68	61	66
Willingness to Bet							
American	35.97	52.2	55.06	57.41	61.35	75.15	77.15
Fractional	40.13	49.82	58.85	54.78	65.19	73.08	77.48
Decimal	38.35	46.05	58.04	57.73	61.34	76.59	74.95
Amount to Bet							
American	6.99	8.46	7.25	7.66	9.56	11.28	12.25
Fractional	6.64	8.06	6.55	7.58	8.31	10.97	10.15
Decimal	6.53	8.18	6.12	7.13	8.31	11.2	10.55

The final hypotheses focused on examining the overall mediation between numeracy and team identification on willingness to bet and the amount willing to bet. Two paths were found to

be significant across the three conditions. When subjective numeracy was added to the model examining willingness to bet with team ID, this was also a significant mediation path; however, in this instance the effect switched from positive to negative. This effect was seen throughout each condition and on both willingness to bet and amount willing to bet. Full results can again be seen in Tables 8-13. Numeracy only played a significant mediation role regarding the models testing willingness to bet, not the amount willing to bet. As a result, Hypotheses 5a (*Numeracy will partially mediate the relationship between bet presentation and Team Identification onto willingness to bet*) is confirmed and Hypothesis 5b (*Numeracy will partially mediate the relationship between bet presentation and Team Identification onto amount willing to bet*) is rejected.

CHAPTER SIX

DISCUSSION

Bet Presentation

The first research question proposed for this study asked, “What role does the bet presentation have on consumer behavior in a sports betting scenario?” Results from this study provide meaningful insight into this query. Because American odds are presented in a base hundred format (e.g., +120), it was hypothesized this would increase participants’ willingness to bet larger amounts of money regardless of geographical location or familiarity with a certain bet presentation. Appraisal theory notes that previous experience and relevance of stimuli to an individual will result in differing appraisals of a stimuli. In this context, the bet presentation was hypothesized to influence consumer behavior based upon how familiar the participant was with the bet presentation format and the individual’s level of numeracy and team identification.

The results indicated that there was no significant difference between bet presentation conditions and willingness to bet, leading to a rejection of H1a. In retrospect, this finding is not unexpected. Much of this research is based off behavioral pricing literature, which specifically examines how individuals respond to specific prices. The concept of face value was utilized; as noted by Raghurir and Srivastava (2002), consumers use the number itself as a reference and make decisions based off this reference, when specifically looking at differences between currencies. In the case of willingness to bet, it is not presented as any type of price, and as such we should not anticipate the effects of behavioral pricing to influence this dependent variable. However, there was a significant difference between the groups who saw American odds first and those who saw fractional odds first when looking at amount willing to bet. While there was a mean difference, there was no significant difference with those who saw decimal odds first. This

implies that the potential negative math anxiety effects only come into play when fractions are presented to consumers. As a result, H1b is also rejected.

When examining differences based on geographic location more significant differences were seen. When American odds were presented first, both participants from the UK and Australia reported significantly higher amounts willing to bet compared to decimal or fractional first. Furthermore, when American odds were seen first, the subsequent conditions were significantly higher than decimal or fractional first. Conversely, American participants reported betting significantly lower amounts when shown American odds first compared to the other conditions. These results point to American odds influencing consumers differently based upon location. American participants also reported significantly lower levels of familiarity with not just gambling overall, but also with American odds specifically. This lack of familiarity could be the reason the opposing effect was seen in American participants.

This finding may indicate support for concepts taken from the behavioral pricing literature such as of face value, priming, and reference points. For example, when participants saw American odds first, those participants were willing to bet larger amounts in subsequent conditions than those who had seen decimal or fractional odds first. This means that when American odds are viewed first, the participants were primed by the face value to be willing to wager a larger amount of money. Further, this initial bet presentation was used by participants as a reference point for subsequent conditions. When American odds were viewed first, the subsequent conditions of decimal and fractional odds experienced significantly higher amounts willing to bet compared to the other Latin square conditions. The hundred-based American odds shown are presented as magnitudes larger than fractional and decimal odds, which both featured single-digit integers. This larger number may have played a role in participants spending a higher

level of money in this condition. As noted in appraisal theory, individuals will react to stimuli differently based upon the relevance or personal experience. In this case, the larger base format of the American odds appears to influence the appraisal of participants from the USA differently than the participants from the UK and Australia.

The results provide support for Raghurir and Srivastava (2002), who found across multiple continents that people's willingness to spend as well as purchase intentions are altered based on the relationship of the face value of the currency they are exposed to compared to their native currency. These scholars proposed "the face value effect is a manifestation of the tendency to overweight the face value of the foreign money and inadequately adjust for the exchange rate" (Raghurir and Srivastava, 2002, p.346). The current study results provide support that the face value of American betting odds influences participants to bet more money, compared with their native bet presentation. As such, it appears that similarly, the participants are not accounting for the conversion rate between odds, leading to betting more money in the American odds condition.

Behavioral pricing research states that a consumer's personal perceptions, evaluations, and memory of prices influence their consumption and spending behavior (Cheng & Monroe, 2013). The results of this study support the notion that betting odds function similarly to prices, in the ability to function as an anchoring effect, as well as influence consumption and spending behavior. Not only did the odds have an influence in the amount consumers were willing to bet, based upon the differences in experiment condition the betting odds served as a reference point to participants as well. This supports the work of Raghurir and Srivastava (2002), who noted that face value functions as a natural anchor. In this context, the face value of the betting odds

functioned as an anchor to participants for subsequent exposures. These findings provide the basis for treating betting odds as a form of price for consumers.

Further support is provided for Drayer and Shapiro (2011), who found differences in valuation based on reference points shown to consumers regarding sporting tickets both for willingness to pay and for sellers, willingness to accept. In this study, the initial bet presentation shown to participants did function as a reference point which influenced the dependent variable, amount willing to bet, in subsequent conditions. This also strengthens the findings of reference points proposed by Liu and Soman (2008), as it appears the participants were following a form of cognitive cost accounting, as the first condition always functioned as a type of reference point for participants. Support is also provided from the work of Mussweiler and Englich (2003), who noted that anchoring effects are more likely to be found with unfamiliar currencies (Euros in the study's context), but that exposure to the new currency quickly dissipates this effect. This anchoring effect can be seen with the American odds, as across all three groups (American, UK, and Australian) American odds were the least familiar.

Familiarity

These results also provide meaningful insight into the construct familiarity in the context of sports betting as proposed in H2a and H2b, which suggested higher levels of familiarity with gambling would result in higher willingness to bet and amount willing to bet. As noted by Bettman and Sujon (1987) and Kotler and Armstrong (2007), low levels of familiarity can lead to higher perceptions of risks with a transaction while higher levels of familiarity can lead to positive attitude formation and satisfaction. Results indicate that those with the lowest levels of familiarity reported significantly lower willingness to bet and amounts willing to bet in all conditions, confirming H2a (*Increased familiarity with sports betting presentation format will*

result in increased willingness to bet) and H2b (*Increased familiarity with sports betting presentation format will result in increased amount willing to bet*). This supports the notion put forth by Li et al. (2012) that familiarity is a key determinant in participating in a sports gambling scenario.

Additionally, evidence was provided for the notion that familiarity is a key variable not only in participation in an activity such as betting, but also in how much money is invested. As seen in Figures 3 and 4, this study provides evidence to support the correlation between familiarity with gambling and both willingness to bet and amount willing to bet, supporting the notion of appraisal theory that previous experience and relevance will influence how a consumer reacts to stimuli. Importantly to note, American odds were the least familiar type of odds regardless of if the participant was from the UK, Australia, or the US. Further, it was counter intuitive, but participants most familiar with gambling also incorrectly believed the implied probability of their bet to be higher than those less familiar with gambling. It was assumed that those with the most experience would understand the reality of gambling most accurately, as they could rely on their personal experiences. Perhaps this is a result of misplaced confidence or a Dunning-Kruger effect that comes with experience of gambling. While familiarity was a key independent variable, the mediators of numeracy and Team ID also played a key role in the hypothesized relationships.

Numeracy

The second research question asked, “What roles does numeracy play in consumer decision making regarding sports betting?” Numeracy proved to be a more nuanced mediator than had been hypothesized. Numeracy was measured similarly to the other key variables of interest – subjectively. Subjective numeracy was measured through multiple items of self-

reporting. Whether the results were evaluated between the conditions or by country, there were no significant differences in results of the SNS (US: 4.49, UK: 4.34, AUS: 4.66). This finding was surprising, as according to the Program for International Student Assessment or PISA, which measures literacy and mathematical ability from age 15 students in different countries found the UK had the highest score at 502, Australia had 491, while the United States had 478. The overall average was 489. This could indicate that Australians gain significant competency in math past the age of 15, perhaps in secondary or university education.

The results found in Tables 12-17 provide evidence of the mediating effects of team identification and numeracy. Overall, there was a significant direct effect from numeracy, but there was no consistent indirect effect and as such, H3a and H3b are rejected. As noted in the results, when numeracy was added to the mediation preceding team ID, it dominated the effect, turning a positive, significant relationship to a negative, significant one. As such, H5a (*Numeracy will partially mediate the relationship between bet presentation and Team Identification onto willingness to bet*) is accepted and H5b (*Numeracy will partially mediate the relationship between bet presentation and Team Identification onto amount willing to bet*) is rejected. These results are consistent with appraisal theory, as the direct effect of differing levels of numeracy could be seen. However, when considered alone, numeracy did not mediate the relationship between familiarity and willingness to bet.

Previous literature had shown that less numerate individuals were more susceptible to competing information, specifically those involving emotional appeals about their favorite team (Peters et al., 2006). The findings show that team identification was a more influential mediator than subjective numeracy. As the results showed a dominating effect of subjective numeracy over team identification, we can see how affective considerations could potentially influence that

relationship providing support for appraisal theory. Appraisal theory notes emotions arise from the cognitive appraisal of an event versus the event itself. In the current context, team identification had a stronger influence than numeracy. This indicates that the emotions that arose for participants' evaluation of the bet played a stronger role than that of numeracy or other cognitive ability.

Once again, Table 18 indicates an interesting relationship between numeracy and the ability to accurately determine the probability a bet will convey. In the experiment, the real likelihood the bet would convey was 33.3%. Those highest in the self-reported subjective numeracy were shown to have the least accurate predictions of probability the bet will win (75.4%). This may indicate that the question asked to participants was not clear enough in asking for the mathematical percentage the bet would convey, rather than the subjective thoughts of the participant. Although this result was counter intuitive, it does support appraisal theory as an individual's level of numeracy influenced multiple outcomes in a consistent manner.

Team Identification

The final research question asked, "What roles does team identification play in consumer decision making regarding sports betting?" The results provide robust support for the effects of team identification in addition and conjunction to numeracy. Regardless of condition, participants with higher levels of team identification were more willing to bet and willing to bet a larger amount of money, providing support for H4a (*Team Identification will partially mediate the relationship between bet presentation and willingness to bet*) and H4b (*Team Identification will partially mediate the relationship between bet presentation and amount willing to bet*). Team identification is responsible for 25.6% of the variance when included in the full multiple serial mediation model. Although the overall mean did not represent a highly identified sample,

this was mainly due to the lowest level of team identification having 261 participants, while each remaining level of team identification had at least 60 subjects. These findings confirm and expand knowledge within the domain of sport management regarding team identification and the increasingly common activity of sports betting.

Within the sport management literature, this supports the previous work of Wann and Branscombe (1995) who noted the highest in team identification are the most likely to exhibit loyalty bias which influences their perception of matchups. The work of Na, Su, and Kunkel (2019) was also supported in noting how individual biases influence predictions in such a way that individuals overestimate their favorite teams' chances of winning – as those highest in team identification reported the highest probability the individual believed the bet would win. This study also provides insight into how numeracy can interact with team identification and influence potential behaviors.

Further, this relationship was shown as those highest in team identification had the highest willingness to bet and highest amount willing to bet. These results also provide support for Madrigal (2000), who noted that both higher levels of team identification and feeling like one's behavior aligns with social norms were positively related with more favorable purchase intentions, a finding which can now be expanded to sports betting. Additionally, these results provide support for appraisal theory in a sports betting context. Thus, team identification is a key component of consumer willingness to bet and how much they are willing to bet, as had been previously demonstrated within the literature.

Sports Betting Research

These results also provide meaningful knowledge to the domain of sports betting research. While much of the previous behavioral research examining sports betting has revolved

around the potential for problem gambling behaviors or potential motivations for participation, this research provides initial evidence that the presentation of a bet itself can function as a biasing agent to consumers. As consumers around the world are able to access betting with increased ease due to legalization and proliferation of mobile apps, understanding ways to induce more participation at higher investments is critical. Additionally, this study provides initial insight into the potential link in betting consumer behavior and numeracy. Sports betting is an activity that involves plenty of opportunities for numbers and math. Deeper examination into the relationship between betting behavior and numeracy is necessary.

CHAPTER SEVEN

IMPLICATIONS

Theoretical Implications

Overall, the results of this study provide support for the theoretical framework of appraisal theory. Appraisal theory notes that emotions arise from the cognitive appraisal of an event, in this case encountering a sport bet and the teams involved, versus the event itself, which would be the act of placing the bet (Lazarus, 1991). This study has shown that in the context of sports betting, the subjective self-reflective aspect of numeracy has a dominating effect over team identification, turning a positive effect negative. Even further, we see that team identification – a construct which is known to relate significantly to consumers' emotions – has the strongest influence when it comes to willingness to bet and amount willing to bet.

Smith et al. (1993) noted that whether an individual cares about an event and whether the event is good or bad for him or her influence whether the consumer will have a positive or negative reaction towards a stimulus. The results demonstrate that those highest in team identification were most likely to be willing to place the bet as well as bet the most potential money. Team identification relates directly to the two aspects of a primary appraisal: motivational relevance and congruence. Less identified fans will have lower levels of motivational relevance or congruence with regard to their desires for the outcome of the game. Secondary appraisals can be an evaluation of personal resources; thus, in this context, the primary appraisal seems to be the willingness to bet while the secondary appraisal is how much money should be placed. Previous research has noted that when an individual's favorite team is involved, they will be more likely to engage or react; however, when a rival team is displayed there is no difference between the response to them and a neutral team (Hillman et al, 2004).

Understanding how team identification influences both the cognitive and emotional appraisal of consumers in a sports betting context is a novel contribution.

While team identification effects primary appraisals, two effects from numerical cognition potentially influencing participants as well: face value and anchoring. The results indicate that the bet presentation functioned as a face value for participants. Subsequently, this face value functioned as an anchor to participants for the future bets they were shown. This provides the first evidence that the bet presentation functions similarly to how prices work in other contexts. When the face value had the largest base value, the American odds, this served as an anchor, priming participants to bet larger amount of money compared to the lower base value presentations of decimal and fractional odds for participants in the UK and Australia. This finding provides some of the first evidence that bet presentation can serve as an anchor to consumers. Further, this anchor was shown to influence how consumers appraise the subsequent stimuli after the first. What is important to note, is that the participants in the US displayed the opposite effect, leading to believe that familiarity was a key driver of this relationship. This two-step influence is a novel contribution to appraisal theory. Not only are consumers influenced by the appraisal of the first set of betting odds shown, but this initial appraisal also influences subsequent appraisals.

Further, the work of Smith et al. (1993) found that the influence of math anxiety was significant on the consumer's final appraisal. This finding was supported by the results of this study, which showed the dominating effect of subjective numeracy and the potential for math anxiety to influence appraisal was supported. When only considering familiarity and team ID, the effects were positive; becoming negative once subjective numeracy was added to serial mediation. What this means is that individuals are not actually as bad at math as they think they

are and the results support this. As we see the effect become negative, we see that individual's own perceptions of their math ability inhibits their willingness to bet and amount willing to bet.

Although numeracy is generally considered a cognitive variable, we also see the potential for the subjective measure to not only influence cognitive appraisals, but also emotional ones. Furthermore, the idea that a negatively felt emotion (numeracy) overpowers a potentially positive emotion (team ID), also provides a novel contribution to appraisal theory – negative emotions can influence appraisals more than positive when considered in conjunction in a sports betting context. This runs counter to research examining team ID, which has found that individuals high in team ID are more likely to display positive outcomes towards their favorite team, but are not more likely to display negative outcomes regarding rival teams (CITE). These findings provide insight towards potential cognitive biases in consumers within a sports betting context. Although both numeracy and team ID influenced participants, the current study was unable to determine if these were truly cognitive biases or potentially emotional biases.

Research has suggested that an individual's feelings at a given point in time can bias information processing, evaluation, as well as one's behavior towards various stimuli (Schwarz & Clore, 1983). Support was provided for this finding within this context, as we observed that subjective numeracy and team identification both have dominating effects, switching the directionality and influence both evaluation (how likely the bet is to win) and their behavior (in the form of willingness to bet). The findings of this study provide evidence that supports the notion from appraisal theory that emotion, evaluation, and behavior are all closely interrelated.

Additionally, this study provides insight for pricing literature. Previously, pricing literature has focused on the price of consumer goods, how these pricing influence consumers, and how altering the currency of the price can influence consumers. However, there has not been

an examination of bet offerings and how that could be considered a price to consumers. The results of this study provide initial evidence that the bet presentation functions as a price to consumers, as the participants were primed by the initial bet offering onto subsequent offerings seen – similarly as when looking at prices of goods. Because the information within a bet presentation is readily available and immediately salient, it is logical to consider a bet offering as a price to consumers.

Practical Implications

The findings of this study offer valuable information for multiple groups – consumers, sports betting companies, and regulators. Regarding consumers – the understanding that as one becomes more familiar with betting, one will also develop a tendency to overestimate the chances a bet will win was attained. This can provide consumers with an awareness of these unconscious effects and the potential downside to themselves. Problem gambling is one of the largest potential drawbacks associated with gambling, so any step that could help consumers be aware of biases that may lead to betting more money is valuable. Further, consumers should be aware of the effect their own team affiliation has on their perceptions of bets. If consumers avoid betting on teams that he or she feels positive emotional attachments to, he or she can make fewer emotional decisions and rely more heavily upon cognitive resources and concrete information. This in turn would allow for a more analytical approach which may result in making bets which are more likely to win. Conversely, sports betting companies can also benefit from this research.

As the march toward the total legalization of sports betting in the United States continues, sports betting companies will only become more common and have a larger advertising presence in the sports environment. As such, these companies will compete to find competitive edges that can generate more action or higher investments from sports gamblers to increase overall revenue.

The results of this study can help provide guidance to these companies regarding potential competitive advantages.

First, the connection between familiarity and betting is of primary relevance. The fact that the United States was so far behind in familiarity with betting overall, as well as their own native American odds, compared to the United Kingdom and Australia is noteworthy. Participants from the United States reported 5% less familiarity with American betting odds compared to participants from the UK and 11% less than those from Australia. With overall betting familiarity, Americans reported 28% less familiarity (2.83) compared to both the UK and Australia participants. The study shows a direct positive correlation between familiarity and willingness to bet and amount willing to bet. Because of this, it would behoove sports betting companies to enact a mass information campaign to better inform potential gamblers. This could include altering advertisement to focus on teaching individuals how betting works, in an effort to increase the overall familiarity of consumers. This would include providing information for how odds work, what betting lingo means, and what different types of bets exist. While it may not pay immediate dividends in terms of revenue generation, long-term it would provide more consumers who have the potential to invest significant money more regularly.

The second key finding is that those highest in team identification were most likely to bet, were willing to bet the most money, and perceived the bet as having the highest overall chance of conveying. Even though the overall sample was not highly identified, post-hoc testing revealed differences by level of team identification. With this information, sports betting companies can target and try to convert the highest level of sport fans. This could manifest through highly interactive social media, which would specifically target the most loyal fans on platforms such as Twitter, Facebook, Instagram, Reddit, and so forth. Because of the way the

highest-level fans overestimate the chances of their team winning a matchup, sports betting companies are enticed to target fans of local teams. As such, these companies already resort to heavily promoting during primetime or nationally televised games of local teams in an effort to attract these valuable high-team identification fans. Further, with the concept of double jeopardy where large market teams will have more fans as well as more highly identified fans (Doyle et al., 2013), it makes more sense for betting companies to target advertising towards large markets.

The results of the bet presentation influencing consumers is also of note to industry managers. Within the United States, American odds did not have the same effect that had on consumers in the UK and Australia. As such, when it comes to advertising campaigns, sports betting companies could utilize marketing that does not only show American odds, but also fractional and decimal – as American consumers were more familiar with both of those formats than the American odds. This could potentially combat the negative influence that American odds had on the American participant.

Lastly, the finding that subjective numeracy dominates team ID is paramount to sports betting companies. When examined in conjunction with team ID, numeracy had a negative indirect effect on consumption behavior. Sports betting companies could try a different approach to convince potential consumers that they are not as bad at math as they think, or that they are more than capable of figuring out betting odds easily. Those highest in subjective numeracy reported significantly higher levels of both willingness to bet and amounts willing to bet than those with low levels. This would also give sports betting companies a valuable opportunity for CSR initiatives. For example, sports betting companies could provide funding or host math competitions for public school students in an effort to promote math education and confidence in math skills.

The final group who are affected by the findings of this study are government or industry regulators. For years, betting has been illegal throughout most the United States and was seen as a deviant behavior or leads to deviant behaviors (Rocheleau et al., 2021). Further, many individuals who gamble regularly become problematic in a way that can negatively impact their overall quality of life (Kourgiantakis et al., 2013). As such, it is incumbent upon government officials to ensure that those who are betting on sports are doing so in a manner that will help them avoid falling into potentially problematic behavior which could negatively influence society.

The understanding that regardless of mathematical ability, individuals who are asked to bet on a matchup are likely to wildly overestimate the probability the bet will win could be an area to target. The government already uses public service announcements (PSAs) for causes such as stopping smoking, staying active, and wearing a seatbelt to name a few. Utilizing PSAs to inform the public about how probability with betting works could help consumers be better informed of the choices they are making and the reality of the situation they are in. Using an educational campaign that can be spread on social media or that can be run around betting advertisements could prove beneficial to all. If officials want to think bigger, regulators could also attempt to enact legislation to enhance the math education within the United States. An alternative would be to simply revert to the federal ban on sports betting. If consumers in the United States are making uninformed betting decisions, perhaps it is in the public's interest to remove this vice. As there are vast amounts of money already in the sports betting industry here in the United States, it seems unlikely that would occur. However, the ability for government officials to set limits to what an average person can bet in a given time period could potentially

shield consumers from engaging too much and potentially developing problem gambling behaviors.

CHAPTER EIGHT

LIMITATIONS & FUTURE RESEARCH

As with all research, this study is not without limitations. First, the sample was only gathered from three countries. While this was purposefully done to allow for the experiment to be conducted in the native language of English in all conditions, there are still many betting markets around the world that have gone unexamined. Given the observed differences in willingness to bet and familiarity with betting among these three countries, it is likely that betting behavior from countries around the world vary based upon how familiar individuals within that country are with sport betting. Further, different countries place a different emphasis on math education. These differences are also likely to influence participants behavior. Because of this, it is important to collect information from as many cultures as possible to see if these findings hold.

Another limitation of this study was the distribution of team identification among participants. By far, most participants indicated the lowest level of team identification, with 261 participants, while the second largest group was those who reported a level of 4 out of 7, with 120 participants. The remaining levels of team identification each had a minimum of 60 participants. Although clearly the sample is uneven in terms of team identification, post-hoc testing using Levene's test of equality found the variances to be uneven ($F=2.112$, $p = .05$). Using Tamhane's T2 test to test for significance among uneven sample distribution, results show that the differences from the lowest and highest levels of team identification were significant ($p < .001$). Additionally, further research could specifically use the favorite teams of participants in order to attract a more general team identification sample. Although the procedure for analysis

was correct and accounts for these potential differences, obtaining a more evenly distributed sample could be beneficial.

In addition, appraisal theory proposes three distinct aspects: relational, motivational, and cognitive (Lazarus, 1991). The relational aspect refers to the environment participants grew up in, i.e., whether there is a gambling or sport culture or not. The results of this found both location and team ID play a significant role in familiarity. This study examined cognitive influences examining both team ID and numeracy. However, this study did not examine motivational aspects of an appraisal. Capturing participants motivations could be instructive as well. The current research did not ask participants if they are motivated by financial incentives or entertainment when it comes to sports betting. Depending on the motivation of a consumer, different types of bets are likely to be placed and different strategies used. If a consumer is betting for entertainment purposes only, they may be more likely to place a bet on a longshot in hopes of a big payday. Conversely, if a participant is looking primarily to make money, they may be more inclined to select favorites and bet larger amounts or bet smaller amounts on longshots. These different motives could be a significant driver of behavior in a sports betting context.

The next main limitation is that this study utilized an experimental setting regarding hypothetical bets. First, while both the EPL and Australian Football League were in season, the NFL season had just concluded. As a result, participants may have biased views towards each league based on where in the sports' calendar the data was collected. Sports betting behavior is likely to vary greatly when an individual is asked to use their own money to cover a bet as opposed to being given a hypothetical budget (Voelckner, 2006). As such, it is imperative to collect a dataset of actual consumer behavior to better determine the validity of these effects. As more states move to legalize sports betting, the opportunity will exist to have sports gamblers

track their bets or provide betting slips to researchers in an effort to create a more accurate picture of real behavior. If a laboratory setting is still preferred, participants can be asked to log into their own sports betting account to allow researchers to watch their behavior as they make their daily bets.

In addition to the hypothetical nature of bets placed, there is the potential that implied probability was misunderstood by participants. The question regarding implied probability stated, “What is the probability that the previous bet will win?” Participants severely overestimated the likelihood of the bet winning, perhaps because they were expressing their own personal views on how likely it is to win rather than the actual mathematical calculation. Clarifying this by showing participants how implied probability is calculated, then asking the question may result in more accurate responses.

Examining real-world behavior could also help address a future direction for this study – the testing of appraisals after the result of the bet is known. A pre/post examination of consumer behavior would allow for a more comprehensive examination of appraisal theory in the context of sports betting. Logically, participants would have some sort of emotional reaction to finding out if their bet won or lost. These emotions are likely to influence behavior in terms of potentially spurring on more betting in the immediate future or leading to avoidance of the activity. This sort of finding could influence the way sports betting companies interact with online gamblers – providing prompts or messages after wins to entice further action.

Another aspect to consider in the future would be to follow up on the work of Vastfjall et al., (2011), who noted that individuals with lower numeracy were more likely to make decisions based off their current mood regarding sports lottery participation. A future study could include variables involving the consumers’ current mood and attempt to demonstrate a correlation

between mood and their willingness to bet. As this study did not find support that the bet presentation influenced the participants willingness to bet, examining if their current mood would play a significant role could contribute to the literature, as previous literature notes mood is an antecedent to influencing behavior (Belk, 1984). A longitudinal study examining mood as well as betting behavior could provide a compelling link between the two constructs. This research could also help clarify whether team ID and numeracy were functioning as cognitive biases or emotional biases. Narrowing in on these concepts and their potential dual-natures of influence could provide meaningful insight.

In addition to secondary appraisals, there are many other potential behavioral pricing effects similar to face value or anchoring that may be influencing consumer behavior. As an example, what happens when the magnitude of bet presentations is changed? While the findings of this study show some support that American odds prime consumers to bet more, if other presentations are shifted to three digits, will this effect hold? Additionally, one of the limitations of this study was that all participants were asked to bet on a team who was an underdog in the hypothetical situation. This was done purposefully, as underdog odds are generally easier to calculate. However, when we change the math to something more difficult, would that influence the subjective numeracy of participants and their corresponding behavior?

Additionally, as the current study provides support for a face value anchoring effect, it would be prudent to explore the impact of priming effects aimed at increasing the participant's familiarity with betting odds. Mussweiler and Englich (2003) noted that the effects of trying to convert unfamiliar currencies dissipates over time and exposure. This could come in the form of a true learning phase condition in which the odds are explicitly explained to participants prior to asking about their willingness to bet and amount willing to bet. Additionally, longitudinal

research examining how long it takes to increase consumer familiarity with sports betting through exposure to different forms of informative media could provide valuable insights to sports betting companies in particular. The current study only showed participants a bet offering for an underdog – an appealing proposition as the consumer stands to make more money than they initially commit. However, altering this to a favorite, where less money will be earned or increasing the magnitude should be studied to determine if the influences remain consistent.

Further, within the appendix are some competing models testing moderation based upon the bet presentation format seen by participants, using familiarity, numeracy, and team identification as potential moderators. While team ID and familiarity functioned well as moderators, numeracy did not. Further, the interpretation of the effects of bet presentation condition are difficult to interpret. Future research should utilize the bet presentation condition as a moderator itself, using familiarity as the independent variable. This would allow examination of the effect at each type of conditions (American first, decimal first, or fractional first).

The final future direction is to develop a better measure of sports betting numeracy. The numeracy scale utilized asked about comfort with percentages and fractions in general terms. While valuable, the math involved in calculating sports betting odds is different. Fractions, multiplication, division, and algebra can all be used to figure out the betting odds that were presented to participants. As such, it may be more meaningful to gauge participants using a battery of questions based upon the math skills they are directly correlated to the activity they are engaging. Adding more measures that correlate directly to the context could allow for the development of a Sports Betting Numeracy Scale – a valuable contribution to an expanding domain.

CHAPTER NINE

CONCLUSION

As sports betting proliferates throughout the United States, it is likely to become an increasingly large part of the country's larger sports business environment. As such, there is a need to gather a deeper understanding of how consumers make decisions and what influences their behavior with sports betting. The purpose of this study was to examine the effect of the experimental condition of bet presentation, with familiarity, team identification and numeracy on participant's willingness to bet and amount they are willing to bet, through the lens of appraisal theory. The results of a Latin square experimental design revealed participants were willing to bet more money across all conditions when shown American odds first. Additionally, mediation analysis revealed the positive impact of team identification and the contrasting effect of subjective numeracy.

The results provide practical insight to consumers, sports betting companies, and regulators of the newly legalized industry. Theoretically, the insights from this research contribute to multiple domains. For sport management, this research provides novel evidence of the influential nature of team identification in decision making within sports betting scenarios and how it interacts with numeracy. Regarding the concept of numeracy, this research demonstrates numeracy has a negative influence in the context of sports betting when considered in conjunction with Team ID. Lastly, I contribute to the area of behavioral pricing through the demonstrated face value and anchoring effects of American odds in three countries. This work provides the basis for treating betting odds similarly to prices for other consumer goods.

Moving forward, these findings will provide ample opportunity for follow-up studies to establish boundary conditions for the variables of numeracy and team identification within this context. This may come in the form of examining different potential effects based on the magnitude of the numbers, based upon the math of the matchup, or how a learning condition could potentially prime consumers. Overall, this research provides valuable insights both about and to an industry which is poised to snowball in size and revenue. As sports betting becomes increasingly common, the more knowledge that can be generated about this phenomenon will benefit scholars, consumers, sports betting companies, and regulators alike.

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APPENDIX A

EXPERIMENT CONSTRUCT EXAMPLES

Sydney Swans @ Gold Coast Suns	3.00 Sydney Swans	1.40 Gold Coast Suns
Manchester United @ Aston Villa	2/1 Manchester United	2/5 Aston Villa
DAL Cowboys @ LA Chargers	+200 DAL Cowboys	-250 LA Chargers

**Each Matchup was seen by participants in all bet formats – American, decimal, and fractional*

APPENDIX B

IRB APPROVAL



Research Integrity & Compliance
Student Faculty Center
3340 N. Broad Street, Suite 304
Philadelphia PA 19140

Institutional Review Board
Phone: (215) 707-3390
Fax: (215) 707-9100
e-mail: irb@temple.edu



Approval for a Project Involving Human Subjects Research that Does Not Require Continuing Review

Date: 04-Nov-

Protocol Number: 26182
 PI: SRIVASTAVA, JOYDEEP
 Review Type: EXEMPT
 Approved On: 04-Nov-2019
 Committee: A1
 School/College: BUSINESS SCHOOL (1500)
 Department: FSBM:MARKETING & SUPPLY CHAIN MGMT (15090)
 Sponsor: NO EXTERNAL SPONSOR
 Project Title: The Effect of Bet Presentation on Consumer Betting Behavior

The IRB approved the protocol 26182.

The study was approved under Exempt or Expedited review. The IRB determined that the research **does not require a continuing review**, consequently there is not an IRB approval period.

If applicable to your study, you can access your IRB-approved, stamped consent document or consent script through ERA. Open the Attachments tab and open the stamped documents by clicking the Latest link next to each document. The stamped documents are labeled as such. **Copies of the IRB approved stamped consent document or consent script must be used in obtaining consent.**

Note that all applicable Institutional approvals must also be secured before study implementation. These approvals include, but are not limited to, Medical Radiation Committee ("MRC"); Radiation Safety Committee ("RSC"); Institutional Biosafety Committee ("IBC"); and Temple University Survey Coordinating Committee ("TUSCC"). Please visit these Committees' websites for further information.

APPENDIX C

COMPETING MODELS

Based upon feedback, it was deemed necessary to run competing models of analysis utilizing moderation as opposed to the hypothesized serial mediation. This following analysis will examine the bet presentation as the independent variable with willingness to bet and amount willing to bet as the dependent variables. The analysis will use three different moderators: familiarity, numeracy, and team identification. To perform the moderation analysis, Hayes Process Macro Model 1 was utilized. The following tables present the results of the moderation analysis on the overall average willingness to bet and amount willing to bet, as each participant saw each possible condition. Further, analyses for each specific bet presentation format are also provided to be able to compare the conditions directly. Below Tables labeled A1-3 present the moderation analysis for willingness to bet, while Tables labeled B1-3 present the moderation analysis for amount willing to bet. These tables also include the conditional effects of moderation at -1 SD, the mean, and +1 SD.

Table A1
Team ID Moderator

	Total WTB	American WTB	Decimal WTB	Fractional WTB
<i>Model Summary</i>				
R	0.469	0.459	0.424	0.416
R-sq	0.220	0.211	0.180	0.173
MSE	728.846	879.644	910.000	892.178
F	65.798	62.279	51.156	48.722
df1	3.000	3.000	3.000	3.000
df2	699.000	699.000	699.000	699.000
p	0.000	0.000	0.000	0.000
<i>Model</i>				
Constant				
coefficient	47.167	47.9715	44.088	49.442
se	3.887	4.27	4.343	4.3
t	12.136	11.235	10.152	11.498
p	0.000	0.000	0.000	0.000
LLCI	39.536	39.589	35.562	40.999
ULCI	54.800	56.355	52.614	57.884
Bet Pres Condition				
coefficient	-3.087	-3.669	-2.445	-3.147
se	0.710	0.780	0.794	0.786
t	-4.346	-4.702	-3.08	-4.005
p	0.000	0.000	0.002	0.000
LLCI	-4.481	-5.201	-4.002	-4.69

Team ID	ULCI	-1.692	-2.137	-0.887	-1.604
	coefficient	2.813	3.028	3.154	2.256
	se	1.097	1.205	1.225	1.213
	t	2.565	2.514	2.574	1.859
	p	0.011	0.012	0.010	0.063
	LLCI	0.660	0.663	0.748	-0.126
	ULCI	4.965	5.393	5.559	4.638
Interaction					
	coefficient	0.770	0.810	0.695	0.806
	se	0.194	0.214	0.217	0.215
	t	3.960	3.790	3.197	3.745
	p	0.000	0.000	0.002	0.000
	LLCI	0.388	0.390	0.268	0.383
	ULCI	1.152	1.229	1.121	1.228
<i>Conditional effects of the focal predictor at values of the moderator(s):</i>					
<i>Team ID (-1 SD) 1.112</i>					
	Effect	-2.230	-2.768	-1.672	-2.251
	se	0.544	0.597	0.607	0.601
	t	-4.103	-4.636	-2.753	-3.743
	p	0.000	0.000	0.006	0.000
	LLCI	-3.298	-3.941	-2.865	-3.432
	ULCI	-1.163	-1.596	-0.480	-1.070
<i>Team ID (mean) 3.168</i>					
	Effect	-0.647	-1.104	-0.244	-0.594
	se	0.394	0.433	0.441	0.436
	t	-1.642	-2.549	-0.554	-1.363
	p	0.101	0.011	0.580	0.174
	LLCI	-1.421	-1.954	-1.109	-1.451
	ULCI	0.127	-0.254	0.621	0.262
<i>Team ID (+1 SD) 5.224</i>					
	Effect	0.936	0.561	1.184	1.062
	se	0.579	0.636	0.647	0.640
	t	1.617	0.882	1.831	1.659
	p	0.106	0.378	0.068	0.098
	LLCI	-0.201	-0.688	-0.086	-0.195
	ULCI	2.072	1.809	2.454	2.320

Overall, the R-squared values range from 17-22%, around the same values for the mediation models. In the first model testing team ID as a moderator, team ID has a significant

direct effect in all models except for the fractional condition. However, every model tested does have a significant moderation interaction effect. Further, the bet presentation condition has a significant direct effect which negatively influenced each condition. Looking at the conditional effects, we see that the -1 SD has a significant negative effect in each tested condition. This means that low levels of team ID have a negative influence on willingness to bet, when considering the bet presentation condition. At the mean, only the willingness to bet on American odds has a significant negative effect. All other conditional effects are not significant. As the overall moderation is significant, this points to the low levels of team ID being the primary driver of the moderation.

Table B1
Team ID Moderator

	Total \$WTB	American \$WTB	Decimal \$WTB	Fractional \$WTB
<i>Model Summary</i>				
R	0.318	0.299	0.287	0.279
R-sq	0.101	0.089	0.082	0.078
MSE	32.926	47.201	36.199	39.323
F	26.123	22.976	20.937	19.771
df1	3.000	3.000	3.000	3.000
df2	699.000	699.000	699.000	699.000
p	0.000	0.000	0.000	0.000
<i>Model</i>				
Constant				
coefficient	9.637	9.661	9.189	10.060
se	0.825	0.989	0.866	0.903
t	11.683	9.768	10.609	11.144
p	0.000	0.000	0.000	0.000
LLCI	8.017	7.719	7.489	8.288
ULCI	11.256	11.603	10.889	11.832
Bet Pres Condition				
coefficient	-0.824	-0.817	-0.766	-0.889
se	0.151	0.181	0.158	0.165
t	-5.468	-4.522	-4.842	-5.388
p	0.000	0.000	0.000	0.000
LLCI	-1.120	-1.172	-1.077	-1.213
ULCI	-0.528	-0.462	-0.456	-0.565
Team ID				
coefficient	0.039	0.303	0.009	-0.194
se	0.233	0.279	0.244	0.255
t	0.169	1.087	0.038	-0.763
p	0.866	0.277	0.97	0.446

	LLCI	-0.417	-0.244	-0.471	-0.694
	ULCI	0.496	0.851	0.489	0.306
Interaction					
	coefficient	0.138	0.108	0.139	0.167
	se	0.041	0.049	0.043	0.045
	t	3.341	2.18	3.191	3.707
	p	0.001	0.029	0.002	0.0002
	LLCI	0.057	0.011	0.053	0.079
	ULCI	0.219	0.205	0.223	0.256
<i>Conditional effects of the focal predictor at values of the moderator(s):</i>					
<i>Team ID (-1 SD) 1.112</i>					
	Effect	-0.671	-0.697	-0.613	-0.703
	se	0.115	0.138	0.121	0.126
	t	-5.816	-5.041	-5.507	-5.565
	p	0.000	0.000	0.000	0.000
	LLCI	-0.897	-0.969	-0.851	-0.951
	ULCI	-0.444	-0.426	-0.375	-0.455
<i>Team ID (mean) 3.168</i>					
	Effect	-0.387	-0.476	-0.328	-0.358
	se	0.084	0.1	0.088	0.092
	t	-4.631	-4.739	-3.737	-3.914
	p	0.000	0.000	0.000	0.000
	LLCI	-0.552	-0.672	-0.501	-0.538
	ULCI	-0.223	-0.279	-0.156	-0.179
<i>Team ID (+1 SD) 5.224</i>					
	Effect	-0.104	-0.254	-0.044	-0.014
	se	0.123	0.147	0.129	0.134
	t	-0.846	-1.722	-0.342	-0.105
	p	0.398	0.086	0.733	0.916
	LLCI	-0.345	-0.543	-0.297	-0.278
	ULCI	0.137	0.036	0.209	0.249

Table B1 examined the amount willing to bet using team ID as a moderator. Similar to the mediation models, the R-squared value is much lower when looking at amount willing to bet compared to willingness to bet as all models fell within the 7-10% range. In this model, the bet presentation condition has a significant negative direct effect on the amount willing to bet. In each model tested, team ID did not have a significant direct effect. However, when looking at the interaction effect, there is a significant positive effect in each condition. Looking at the conditional effects, there are significant negative effects of team ID at both the -1 SD and mean levels. There are no significant effects for the highest levels of team ID. Similar to the A1 model, the lower levels of team ID are driving the moderation effects.

Table A2
Numeracy Moderator

	Total WTB	American WTB	Decimal WTB	Fractional WTB
<i>Model Summary</i>				
R	0.289	0.250	0.269	0.285
R-sq	0.084	0.063	0.073	0.081
MSE	857.809	1044.834	1027.379	991.874
F	20.944	15.347	18.067	20.355
df1	3.000	3.000	3.000	3.000
df2	699.000	699.000	699.000	699.000
p	0.000	0.000	0.000	0.000
<i>Model</i>				
Constant				
coefficient	43.609	42.763	40.312	47.752
se	7.135	7.875	7.809	7.672
t	6.111	5.431	5.163	6.224
p	0.000	0.000	0.000	0.000
LLCI	29.599	27.302	24.981	32.688
ULCI	57.618	58.224	55.643	62.816
Bet Pres Condition				
coefficient	-3.271	-2.921	-2.719	-4.174
se	1.328	1.466	1.454	1.428
t	-2.463	-1.992	-1.871	-2.923
p	0.014	0.047	0.062	0.004
LLCI	-5.879	-5.799	-5.573	-6.978
ULCI	-0.664	-0.042	0.135	-1.370
Numeracy				
coefficient	2.471	2.962	2.794	1.657
se	1.528	1.686	1.672	1.643
t	1.617	1.757	1.671	1.009
p	0.106	0.079	0.095	0.314
LLCI	-0.529	-0.349	-0.489	-1.569
ULCI	5.470	6.272	6.077	4.882
Interaction				
coefficient	0.653	0.478	0.615	0.864
se	0.283	0.313	0.310	0.305
t	2.304	1.531	1.985	2.838
p	0.022	0.126	0.048	0.005
LLCI	0.097	-0.135	0.007	0.266
ULCI	1.209	1.092	1.224	1.462

<i>Conditional effects of the focal predictor at values of the moderator(s):</i>				
<i>Numeracy (-1 SD) 2.949</i>				
Effect	-1.347	-	-0.905	-1.625
se	0.601	-	0.657	0.646
t	-2.241	-	-1.376	-2.516
p	0.025	-	0.169	0.012
LLCI	-2.526	-	-2.196	-2.894
ULCI	-0.167	-	0.386	-0.357
<i>Numeracy (mean) 4.463</i>				
Effect	-0.359	-	0.026	-0.317
se	0.427	-	0.468	0.460
t	-0.840	-	0.057	-0.691
p	0.401	-	0.955	0.490
LLCI	-1.198	-	-0.892	-1.220
ULCI	0.480	-	0.945	0.585
<i>Numeracy (+1 SD) 5.976</i>				
Effect	0.629	-	0.958	0.990
se	0.609	-	0.667	0.656
t	1.031	-	1.435	1.511
p	0.303	-	0.152	0.131
LLCI	-0.568	-	-0.352	-0.297
ULCI	1.826	-	2.268	2.278

Table A2 examines numeracy as a potential moderator for willingness to bet. The R-squared values when examining numeracy are much lower than for the team ID models, as each fell within the 6-8% range. The bet presentation condition had a significant, negative direct effect in all conditions aside from decimal odds. Numeracy did not have a significant direct effect; however, the interaction effect was significant in all conditions aside from the American odds. Looking at the conditional effects, only the -1 SD conditional effect was significant for the overall model and for fractional odds. In this case, the significant moderation was driven by low levels of numeracy rather than the mean or +1 SD levels.

Table B2
Numeracy Moderator

	Total \$WTB	American \$WTB	Decimal \$WTB	Fractional \$WTB
<i>Model Summary</i>				
R	0.243	0.204	0.236	0.232
R-sq	0.059	0.041	0.056	0.054
MSE	34.436	50.051	37.384	40.268
F	14.468	9.942	13.596	13.123
df1	3.000	3.000	3.000	3.000
df2	690.000	690.000	690.000	690.000
p	0.000	0.000	0.000	0.000
<i>Model</i>				
Constant				
coefficient	8.637	10.403	8.122	7.385
se	1.429	1.724	1.490	1.546
t	6.041	6.036	5.543	4.777
p	0.000	0.000	0.000	0.000
LLCI	5.829	7.019	5.197	4.349
ULCI	11.443	13.787	11.046	10.419
Bet Pres Condition				
coefficient	-0.805	-0.934	-0.815	-0.667
se	0.266	0.321	0.277	0.288
t	-3.026	-2.910	-2.939	-2.317
p	0.003	0.004	0.003	0.021
LLCI	-1.328	-1.564	-1.359	-1.232
ULCI	-0.283	-0.304	-0.271	-0.102
Numeracy				
coefficient	0.241	0.021	0.246	0.455
se	0.306	0.369	0.319	0.331
t	0.786	0.056	0.770	1.376
p	0.432	0.955	0.442	0.169
LLCI	-0.360	-0.704	-0.381	-0.195
ULCI	0.842	0.745	0.872	1.105
Interaction				
coefficient	0.098	0.109	0.112	0.072
se	0.057	0.068	0.059	0.061
t	1.720	1.603	1.885	1.169
p	0.086	0.110	0.060	0.243
LLCI	-0.014	-0.025	-0.005	-0.049
ULCI	0.209	0.244	0.228	0.192

Table B2 examines numeracy as a potential moderator for the amount to bet. The difference in the R-squared value between the willingness to bet model is far less than that of the team ID moderation, as each value fell within the 4-6% range. The bet presentation condition had a significant, negative direct effect in all conditions. Numeracy did not have a significant direct effect. Furthermore, there was no significant moderation in this model at any level for any condition.

Table A3

Familiarity Moderator				
	Total WTB	American WTB	Decimal WTB	Fractional WTB
<i>Model Summary</i>				
R	0.515	0.477	0.462	0.487
R-sq	0.265	0.227	0.214	0.237
MSE	686.918	861.432	872.512	823.163
F	84.036	68.522	63.365	72.342
df1	3.000	3.000	3.000	3.000
df2	699.000	699.000	699.000	699.000
p	0.000	0.000	0.000	0.000
<i>Model</i>				
Constant				
coefficient	46.734	48.667	43.285	48.252
se	3.939	4.411	4.439	4.312
t	11.865	11.033	9.751	11.191
p	0.000	0.000	0.000	0.000
LLCI	39.000	40.006	34.569	39.786
ULCI	54.468	57.327	52.001	56.717
Bet Pres Condition				
coefficient	-4.213	-4.766	-3.446	-4.426
se	0.745	0.834	0.839	0.815
t	-5.658	-5.717	-4.107	-5.430
p	0.000	0.000	0.000	0.000
LLCI	-5.674	-6.403	-5.094	-6.026
ULCI	-2.751	-3.129	-1.799	-2.825
Familiarity				
coefficient	3.303	3.126	3.772	3.012
se	1.157	1.296	1.304	1.267
t	2.855	2.413	2.893	2.378
p	0.004	0.016	0.004	0.018
LLCI	1.032	0.582	1.212	0.525
ULCI	5.575	5.670	6.332	5.498
Interaction				

coefficient	0.968	1.005	0.855	1.403
se	0.208	0.233	0.234	0.227
t	4.660	4.323	3.653	4.588
p	0.000	0.000	0.000	0.000
LLCI	0.560	0.549	0.396	0.597
ULCI	1.376	1.462	1.315	1.490
<i>Conditional effects of the focal predictor at values of the moderator(s):</i>				
<i>Familiarity (-1 SD) 1.403</i>				
Effect	-2.855	-3.356	-2.247	-2.962
se	0.518	0.579	0.583	0.567
t	-5.515	-5.789	-3.851	-5.227
p	0.000	0.000	0.000	0.000
LLCI	-3.871	-4.494	-3.392	-4.075
ULCI	-1.838	-2.218	-1.101	-1.849
<i>Familiarity (mean) 3.278</i>				
Effect	-1.040	-1.471	-0.644	-1.006
se	0.388	0.434	0.437	0.425
t	-2.682	-3.386	-1.472	-2.370
p	0.008	0.001	0.142	0.018
LLCI	-1.802	-2.234	-1.502	-1.840
ULCI	-0.279	-0.618	0.215	-0.173
<i>Familiarity (+1 SD) 5.153</i>				
Effect	0.774	0.414	0.959	0.949
se	0.578	0.649	0.653	0.635
t	1.336	0.638	1.469	1.496
p	0.182	0.524	0.142	0.135
LLCI	-0.364	-0.861	-0.323	-0.297
ULCI	1.913	1.689	2.242	2.195

Table A3 examined familiarity as a potential moderator on willingness to bet. In this case the models' R-squared all fall within the 21-25% range, much stronger than the numeracy model. Once again, the bet presentation condition has a significant, negative direct effect. Familiarity, on the other hand, has a positive significant effect on each model tested. Further, the interaction effects are positive and significant in each condition. Looking at the conditional effects, at the -1 SD level, each condition has a significant negative effect. At the mean level, there is a significant negative effect on all conditions aside from decimal odds. In this case, the low levels of familiarity are the primary driving forces of the moderation effect.

Table B3
Familiarity Moderator

	Total \$WTB	American \$WTB	Decimal \$WTB	Fractional \$WTB
<i>Model Summary</i>				
R	0.338	0.285	0.322	0.318
R-sq	0.114	0.081	0.104	0.101
MSE	32.339	47.646	35.365	38.342
F	30.028	20.586	26.919	26.242
df1	3.000	3.000	3.000	3.000
df2	699.000	699.000	699.000	699.000
p	0.000	0.000	0.000	0.000
<i>Model</i>				
Constant				
coefficient	10.264	11.456	9.608	9.726
se	0.855	1.037	0.894	0.931
t	12.009	11.044	10.750	10.452
p	0.000	0.000	0.000	0.000
LLCI	8.586	9.419	7.853	7.899
ULCI	11.941	13.493	11.363	11.553
Bet Pres Condition				
coefficient	-1.059	-1.160	-1.000	-1.019
se	0.162	0.196	0.169	0.176
t	-6.561	-5.917	-5.920	-5.794
p	0.000	0.000	0.000	0.000
LLCI	-1.377	-1.545	-1.332	-1.365
ULCI	-0.743	-0.775	-0.668	-0.674
Familiarity				
coefficient	-0.145	-0.285	-0.102	-0.048
se	0.251	0.305	0.263	0.273
t	-0.577	-0.934	-0.388	-0.176
p	0.564	0.351	0.698	0.860
LLCI	-0.638	-0.883	-0.617	-0.585
ULCI	0.348	0.314	0.414	0.489
Interaction				
coefficient	0.198	0.208	0.196	0.189
se	0.045	0.055	0.047	0.049
t	4.386	3.805	4.152	3.854
p	0.000	0.000	0.000	0.000
LLCI	0.109	0.101	0.103	0.093
ULCI	0.286	0.316	0.288	0.285

<i>Conditional effects of the focal predictor at values of the moderator(s):</i>				
<i>Familiarity (-1 SD) 1.403</i>				
Effect	-0.783	-0.868	-0.726	-0.754
se	0.112	0.136	0.118	0.122
t	-6.967	-6.368	-6.177	-6.165
p	0.000	0.000	0.000	0.000
LLCI	-1.003	-1.136	-0.956	-0.994
ULCI	-0.562	-0.601	-0.495	-0.514
<i>Familiarity (mean) 3.278</i>				
Effect	-0.412	-0.478	-0.359	-0.399
se	0.084	0.102	0.088	0.092
t	-4.896	-4.679	-4.076	-4.359
p	0.000	0.000	0.000	0.000
LLCI	-0.577	-0.679	-0.532	-0.579
ULCI	-0.247	-0.277	-0.186	-0.219
<i>Familiarity (+1 SD) 5.153</i>				
Effect	-0.042	-0.088	0.008	-0.045
se	0.126	0.153	0.135	0.137
t	-0.330	-0.575	0.062	-0.329
p	0.741	0.566	0.951	0.743
LLCI	-0.289	-0.388	-0.250	-0.314
ULCI	0.205	0.212	0.266	0.224

In model B3, familiarity was tested as a moderator on amount willing to bet. The R-squared value for these models fall within the 8-11% range. Consistent with the mediation analyses, willingness to bet overall provided better R-square values, accounting for more of the potential variance. The bet presentation condition once again had a significant, negative direct effect. Familiarity did not have a significant direct effect; however, there was a significant interaction effect in each condition. Looking at the conditional effects, the -1 SD and mean values of familiarity had significant, negative effects. Once again, the low levels of familiarity are the driving force for moderation.

Overall, these models provided relatively consistent results with previous mediation analyses. Familiarity and team ID specifically were valuable moderators, while numeracy did not have the same impact or provide the same account of variance as the other moderators. One issue with this moderation analysis is the interpretation of the bet presentation condition. This variable noted if the condition seen was American odds first, decimal odds first, or fractional odds first. However, the interpretation of a negative effect is difficult to understand. For easier interpretation, bet presentation condition should be utilized as a moderator itself rather than an independent variable. If analysis were conducted in this manner, it would be easy to see the effects at the different conditions – like how the conditional effects were interpreted in the previous analyses.