An Experimental Investigation of Decision Making in Sport Betting

by

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Abstract

As more states have legalized sport betting, the sport betting industry is rapidly growing, and sportsbooks are racing to gain a share of this emerging market in the United States. Sports betting coverage, advertisements, and promotions are prominently exposed to the public with the aim of promoting sport betting, acquiring new customers, and normalizing gambling. Sportsbook operators are refining and innovating their marketing and operational strategies to retain customers and boost profitability. At the same time, the number of Americans who regularly bet on sports is increasing with a spike in the number of people with gambling disorder. Although previous studies have explored gambling behavior and sport betting promotions, further understanding of decision making when sport bettors wager on sporting events under the effect of changing odds and gambling promotions is needed. The purpose of this dissertation is to employ experimental design in investigating how changes of betting odds, promotional offers, and sport bettor characteristics influence betting decisions when sport bettors wager on sporting events and exploring the potential role of emotional states during decision making as an underlying mechanism. Study 1 focuses on betting odds and examines how changes of betting odds through line movement and odd-related promotions affect bettors' decision making when placing a bet on NFL games. Study 2 focuses on gambling promotional offers (i.e., risk-free bets and profit boost) and investigates the interaction effect of promotional offers and sport bettor characteristics (i.e., risk-taking tendence and betting experience) on the risk-taking levels of bettors when they bet on NBA games. Study 3 replicates and expands Study 2 by testing the

mediating role of emotional states in sport betting decision making. The results of the studies suggest that betting odds and gambling promotional offers are two important external factors that can change the decision making and risk-taking levels of sport bettors. In addition, the results reveal an interesting interaction effect between promotional offers and sport bettor characteristics, suggesting that bettors' risk-taking tendency and betting experience can significantly influence their responses to gambling promotions. Furthermore, the findings of the final study underscore the role of fear in the betting process and its impact on responses to gambling promotions, a factor previously overlooked in research on emotional reactions to gambling marketing techniques. This dissertation enhances our understanding of (i) heuristic decision making in sport betting, (ii) marketing framing in sport betting, and (iii) the role of emotion in the risk decision-making process and gambling marketing. The findings also shed new empirical insights on how sport bettors utilize betting odds and promotional offers to inform betting decisions, how different groups of customers may exhibit different levels of risk-taking under the influence of gambling marketing, and how their emotional states during decision making (i.e., fear and joviality) predict and explain their betting behavior, which have important marketing as well as policy ramifications.

Chapter 1 Introduction

As legal sports betting expands rapidly in the United States, the industry brings more people to the game and continues to break revenue records. According to the American Gaming Association, legal sportsbooks witnessed a substantial increase in the amount of money wagered, and commercial sports betting revenue hit an all-time high in 2022 (Greenberg, 2023). One of the most watched sporting events, Super Bowl LVII broke legal U.S. sports betting activity records, with more than 100 million online transactions tracked during the Super Bowl weekend at legal sportsbooks (McQuilan, 2023). Sports betting is a driver not only of revenue but also of fan engagement. People can consume games with different types of wagering and stay interested in the game (Barnes, 2022). Sports betting makes watching sports more enjoyable and exciting and, at the same time, grows a new fanbase for sports entities and events (American Gaming Association, 2023; Bridge, 2022). The future growth of the U.S. sports betting market is expected to remain strong thanks to the expansion of legal sports betting into new states in the coming years and continued adoption and evolution of new wagering options such as in-play betting (iGB, 2023; Newall et al., 2021a).

The expansion of the lucrative sports betting market generates fierce competition among betting platforms. Sportsbook operators have been racing to acquire customers and increase their market share of the rapidly growing industry. After investing billions of dollars for the success of business expansion, most online sportsbooks have been struggling to make profits in their first few years of operation, and they are shifting their focus to retain customers and profitability (Funt, 2022; Ramsey, 2023). Meanwhile, with a rapid increase in the number of people betting

on sports, it should be noted that gambling is risky and can cause financial, health, and social harm to individuals (Dowling, 2014). The booming sports betting industry has been developing gambling problems and addictions, with a spike in inquiries to the National Problem Gambling Helpline Network and an increasing number of people with gambling disorders (Hernandez, 2022). However, focus on gambling problems treatment or research and resources for gambling addiction programs have been sparse in the United States (Meyersohn, 2023). Many states legalized sports betting without estimating the cost of gambling problem resources and robust consumer protections (Meyersohn, 2023). Current situations point to the need for increased profitability for sportsbook operators as well as enhanced consumer protection.

Understanding how sports bettors behave and make decisions is essential for developing effective sport betting marketing strategies, as well as implementing prevention and treatment of problem gambling. Therefore, this dissertation aims to provide a better understanding of how sport bettors make decisions when they bet on sports in the U.S., where legal sports betting is rapidly growing and where betting promotions are predominantly utilized to influence betting behavior and decisions. The dissertation also examines emotional states during decision making, which play a crucial role in betting and risk decision making, as an underlying mechanism. On the one hand, insights can help sportsbook operators understand the effectiveness of their promotional offers among different groups of sport bettors and inform future marketing strategies to acquire new and retain existing customers. On the other hand, further understanding of sports bettor behavior can provide gambling regulation authorities and organizations with empirical evidence that can be useful in establishing guidelines for gambling promotion and problem gambling prevention.

1.1 Promotional Offers in Sport Betting

Marketing is one critical area to differentiate a company's betting products from competitors, and promotional offers are one of the most used marketing techniques by sportsbooks to attract customers (Funt, 2022; Hing et al., 2017a; Houghton et al., 2019; Reichenberg, 2021; Tussey, 2023). Sportsbooks in the United States have been spending lavishly on promotions to lure new customers and increase market share (Funt, 2022). A sportsbook promotional offer is when a sportsbook provides users with incentives and chances to win more money, which are available throughout the betting experience (Ammirante, n.d.; BetMGM, 2023). Common promotional techniques include welcome bonuses, deposit match bonuses, odds boosts, and risk-free bets (Ammirante, n.d.). Promotional offers are one of the most shown content in sports betting advertising that sportsbooks use to portray sports betting as a risk-free and fun activity, as well as normalize sport betting (Killick & Griffins, 2020; Killick & Griffins, 2022a; Thomas et al., 2012). In addition, promotional offers are effective and persuasive marketing strategies to encourage individuals to wager online and bet on sports (Deans et al., 2016; Deans et al., 2017; Lopez-Gonzalez et al., 2020a). A Morning Consult survey found that promotional offers are the priority when sports bettors choose a sports betting platform (Silverman, 2022). Promotional offers, bonuses, and rewards are the very important factors that drive sports bettors to use a specific sportsbook (Silverman, 2022).

A handful of studies have explored different types of promotional offers provided by sportsbook operators and how they affect sports betting behavior. Hing et al. (2015c, 2016b) identified 15 generic types of wagering inducements that offer financial incentives to customers in Australia such as bonus bets, better odds, and better winnings. These promotions are subject to complex terms and conditions, which are obscured by legalistic language and can cause betting-

related harm. Few studies have categorized different types of promotional offers in the United States, but American sportsbooks appear to have similar promotions such as sign-up bonuses and odds boosts to offer bonus bets and better odds to sports bettors (e.g., Ammirante, n.d.; Hudson, 2023; Firstenberg, 2023). Risk-free bets and better odds are the two most common and popular incentives promoted by sportsbooks (Etuk et al., 2022; Houghton et al., 2019; Killick & Griffiths, 2022a, 2022b; Newall et al., 2019; Rawat et al., 2020; Rossi et al., 2021). Research has shown that risk-free bets are the most popular inducement for sports bettors that draw the most attention and desire to bet (Hing et al., 2017a, 2019b; Lole et al., 2020). They are also the most persuasive content in betting advertisements to convert attention into the likelihood of betting (Hing et al., 2017b). Meanwhile, Rockloff et al. (2019) found that better odds and winnings are the most attractive incentive among sport bettors.

Furthermore, promotional offers significantly influence sports bettors' decisions when they place a bet (Deans et al., 2017). Researchers discovered a significant relationship between promotions and sports bettor behavior. A line of research also highlights the link between promotions and gambling-related harms. For instance, sports bettors are more likely to place more and larger bets when promotional offers are provided and underestimate the true cost of these offers (Hing et al., 2019a). Promotions also increase the likelihood of betting when it is not planned (Browne et al., 2019; Hing et al., 2018a; Killick & Griffiths, 2022a). Unsurprisingly, promotional offers make sports bettors more vulnerable to biases and irrational decision-making (e.g., Browne et al., 2016; Kristiansen & Trabjerg, 2017; Lopez-Gonzalez et al., 2017b), increase sports bettors' impulsive betting and riskier gambling behavior (Hing et al., 2018a; Rockloff et al., 2019), and contribute to problem gambling severity (Hing et al., 2016a).

Today, sportsbook operators are more cost-conscious (Funt, 2022), and sports bettors are also becoming more sophisticated, making them more challenging to entice (Hagan, 2017). Some sports bettors are learning how to take advantage of sportsbook promotions to win more money (Holzhauer, 2021), which is one of the most important betting skills (Nyemcsok et al., 2022). Given that not all gamblers are the same, sport bettors may react to and utilize gambling promotions differently (Lamont et al., 2016; Thomas et al., 2012). More detailed understanding of the influence of different types of promotional offers and individual differences on bettors' decision making is needed (Hing et al., 2017a; Lamont et al., 2016). Furthermore, the majority of previous studies that looked at sportsbook promotional offers were conducted in Australia and European countries, where legal sport betting has been proliferated. Few studies have investigated how sports bettors react and make decisions under the promotional settings in the United States, where legal sports betting has just been rapidly expanded in the past few years. Since sports betting in different countries has different regulations, restrictions, and length of development (ESPN, 2018), American operators need to gain a better understanding of how sports bettors perceive and react to promotions on a sportsbook. Insights can help operators inform strategic promotion designing and planning processes, improve the effectiveness of their promotions, reduce costs, and increase profitability.

1.2 Betting Odds in Sport Betting

Odds setting is another crucial strategy for sportsbooks to make a profit and attract sports bettors (Boniface et al., 2012; Humpheys et al., 2014; Wheatcroft, 2020). Typically, betting odds are set according to the likelihood and popularity of an outcome. First, oddsmakers set the lines according to the implied probability of either outcome happening (McGrath & Pempus, 2022). In the modern era, bookmakers employ odds compilers and analysts that analyze large amounts of

data to correctly assess the probability of every outcome and run the numbers through mathematical models to quickly set odds (Young, 2023). After setting the opening odds, sportsbooks will engage in line movement by moving lines and adjusting odds when betting action is imbalanced or when information in the market is updated to ensure profitability (Clark, 2021; McGrath & Pempus, 2022). When a large amount of money is wagered on one side of a bet, sportsbooks will adjust the odds to incentivize bettors to take the other side to balance the book's bottom line. For example, if a large amount of money is wagered on the favorite, the odds of the underdog will likely increase. If the underdog attracts a lot of money wagered, sportsbooks may reduce the odds of the underdog to protect their margin. Other common causes for line movement include injuries, weather, a team's lineup decision, and leaks of a team's strategic game plan, etc. (Clark, 2021). Therefore, betting odds are changing constantly, as sportsbook operators are using betting odds to influence bettors' decisions and ensure profitability.

Betting odds are important information during sports bettors' decision making. First, bettors are paid according to the posted odds (Woodland & Woodland, 1991). Since betting odds determine final payouts, sports bettors would carefully scrutinize betting odds and line movement to make their decisions. Studies have found that sports bettors like to compare betting odds offered by different sportsbooks and better odds (e.g., higher payouts) crucially motivate sports bettors to pick a sportsbook (Boniface et al., 2012; Silverman, 2022). Therefore, sportsbook operators would offer competitive odds to retain their customers (Boniface et al., 2012; Tak et al., 2018) and optimize odds setting to gain a competitive edge (Tak et al., 2022). Besides, sportsbooks provide better odds for sport bettors through promotional offers such as odds boosts (Belkora, 2022; DraftKings, n.d.). These promotions are frequently offered by

popular sportsbooks in the United States, such as BetMGM, DraftKings, and Fanduel, to induce customers to place bets by increasing betting odds and potential payouts (Belkora, 2022).

On the other hand, sportsbooks rely on large amounts of game data to set betting odds, and betting odds change based on the betting action and information in the market (Clark, 2021). Therefore, betting odds reveal the theoretical likelihood of an outcome and an oddsmaker's opinion on a particular event (McGrath & Pempus, 2022). Sport bettors can use betting odds to calculate implied probability and identify the favorite and underdog in a matchup to reach betting decisions (Cantinotti et al., 2004; D'Astous & Gaspero, 2015). In addition, sports bettors can track line movement to understand how other bettors bet on a certain game and identify potential updated information (Cantinotti et al., 2004; De Saro & Pempus, 2023). However, odds-implied probabilities could be misleading by random chance in sport or mispricing of the odds (Wheatcroft, 2020).

Thus, betting odds play an important role when sports bettors place wagers (e.g., Francisco & Moore, 2019; Woodland & Woodland, 1991). It is crucial to understand how sports bettors react to changes of betting odds and how they use betting odds to make decisions. Although previous research suggests the effect of betting odds and line movement on sports bettors' decision making (e.g., Boniface et al., 2012), few studies examine how bettors change their betting selections when betting odds and lines shift. More insights into the influence of odds changes and odds-related promotions are needed to advance our understanding of betting decision making in a dynamic gambling world, where betting-related information such as betting odds can fluctuate constantly. Insights can also benefit sportsbook operators in an effective and profitable odds setting.

1.3 Sport Bettor Characteristics

Not all gamblers are the same. Sports bettors possess different characteristics, which also play an important role in their betting behavior. Research has shown that personal traits, values, experience, and motivation influence betting behavior and decisions (Armstrong et al., 2020; Fang & Mowen, 2009). For instance, previous studies found that gambling motives lead to different decisions (Cason et al., 2020), gambling frequency (Dechant, 2013), and perceptions (Canale et al., 2015). People's beliefs about control over the gambling system and the expectation of their gambling success are strongly associated with gambling frequency and problem gambling (Moore & Ohtsuka, 1999). Identification with a team or an athlete increases participation in sports betting (Mahan et al., 2012), as well as vulnerability to sport betting promotions and marketing strategies (Deans et al., 2016; Winters & Derevensky, 2019). In contrast, bettors who are more experienced may identify some promotions as high risks (D'Astous & Gaspero, 2015), and thus avoid falling into the trap. Therefore, sport bettor characteristics are important predictors of gambling participation and behavior (e.g., Fang & Mowen, 2009; Moore & Ohtsuka, 1999).

To date, less is known about the role of sports bettor characteristics in sports betting decision making when different types of promotional offer are provided. Thomas et al. (2012) found that gender, age, and household income have an effect on bettor reactions to gambling marketing and incentives. For example, younger men, older women, and those from low socio-economic backgrounds are more likely to show positive attitudes to gambling incentive schemes and participate more in betting in order to take advantage of promotional offers. The authors suggest the interaction between different types of betting products, marketing strategies, and different groups of individuals. Lamont et al. (2016) explored affective responses to gambling

promotions and developed a conceptual model to inform future research examining the interplay between the delivery of gambling promotion messages, sport audience characteristics, and audience responses. Although previous studies have found that promotional offers increase riskier and impulsive bets (e.g., Hing et al., 2018a; Rockloff et al., 2019), not all the gamblers are the same and not all the sport bettors exhibit higher risk-taking levels under the effect of promotional offers. An in-depth understanding of the influence and effectiveness of gambling promotional offers among different groups of sport bettors can provide suggestions for sportsbooks to develop customized promotions to target different groups of customers. Findings can also inform gambling regulation authorities by highlighting the importance of consumer characteristics in irrational gambling beliefs and risky betting behaviors.

1.4 Emotion in Sport Betting

Extensive research has shown that emotion plays an important role in risk-taking behavior (e.g., Druckman & McDermott, 2008; Johnson & Tversky, 1983; Loewenstein et al., 2001), gambling behavior (e.g., Blaszczynski & Nower, 2002; Dwyer & Weiner, 2018; Mano, 1992), and sports betting experience (Lole et al., 2020). For instance, research has found that inducements in betting advertisements elicit a desire to bet by increasing participants' arousal (Lole et al., 2020). The impact of inducements is also tied to the emotion associated with large sporting events (Deans et al., 2017). Excitement is one of the most studied positive valences in gambling research related to betting behavior (Xu et al., 2021) and motivates individuals to participate in sport betting (Lamont & Hing, 2018). Furthermore, Lamont et al. (2016) discovered both positive and negative affective responses to gambling promotions. Thus, sport betting promotional offers may affect bettors' decisions through inducing bettors' positive and negative emotions.

However, the mediating role of emotion in the relationship between gambling promotions and betting decision making is not fully understood. The impact of negative emotions such as anxiety and fear during the use of gambling promotions to make betting decisions has been ignored in previous sport betting studies. Additionally, sport bettors may exhibit different emotional reactions when making decisions with promotional offers. Therefore, it is important to incorporate both positive and negative emotional experiences during the decision-making process into sport betting studies to further our understanding of how sport betting promotions affect those emotional reactions and the role of emotion in betting behavior. The findings can identify the importance of emotions evoked by risk-free bets and profit boost tokens and whether individual characteristics further influence the emotional experience in sport betting.

1.5 Summary of the Dissertation

The purpose of this dissertation is to investigate the effects of external (i.e., betting odds, promotional offers) and internal (i.e., individual characteristics, emotion) factors on sport bettors' decision making. Although the current sport betting literature has extensively studied betting decisions (e.g., Cantinotti et al., 2004; d'Astous & Gaspero, 2013; Simmons & Nelson, 2006), bias in sport betting (e.g., Hartzmark & Solomon, 2012; Woodland & Woodland, 2001), pathological gambling (e.g., Hing et al., 2015b), and sport betting marketing and promotions (e.g., De Jans, 2022; Deans et al., 2016; Hing et al., 2015a; Killick & Griffiths, 2022a), further understanding of how betting odds and sport betting promotion function in bettors' decision making is needed. Therefore, the dissertation consists of three studies to examine the effect of betting odds on Moneyline and spread bet decisions (Study 1), the interaction effect of promotional offers and sport bettor characteristics on alternative spread bet decisions (Study 2), and the mediating role of emotion in sport betting promotion and betting decisions (Study 3). The

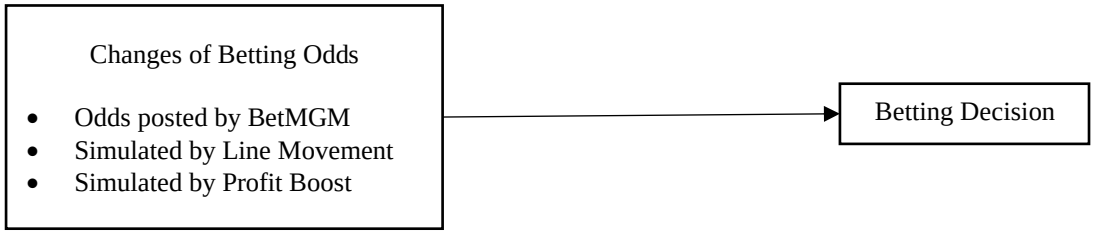
University of Michigan Institutional Review Board (IRB) - Health Sciences and Behavioral Sciences has reviewed the studies and determined that it is exempt from ongoing IRB review (HUM00226321). Figures 1 – 3 below display the conceptual framework of the three studies.

1.5.1 Study 1 – Play the Odds: An Experimental Investigation of the Effect of Betting Odds on Decision Making in Sport Betting

Drawing on heuristic decision making (Tversky & Kahneman, 1974; Gigerenzer & Gaissmaier, 2011), Study 1 is an exploratory study that views betting odds as important heuristics and explores how changes of betting odds affect sports bettors' decision making when they place a bet (i.e., Moneyline bet, spread bet) on NFL games. This study uses a three-level between-subjects experimental design to explore the effect of betting odds through manipulating odds under the situations of line movement and promotional offers (i.e., profit boost). In particular, I created longer odds of the underdog in an NFL game with or without profit boosts to see if sport bettors changed their betting selection, willingness to bet, and betting amount. Study 1 aims to further our understanding of the impact of betting odds on sport betting decision making and the utilization of betting odds for heuristic decision making in a dynamic and uncertain sport gambling world.

Figure 1.1

Conceptual Model of Study 1

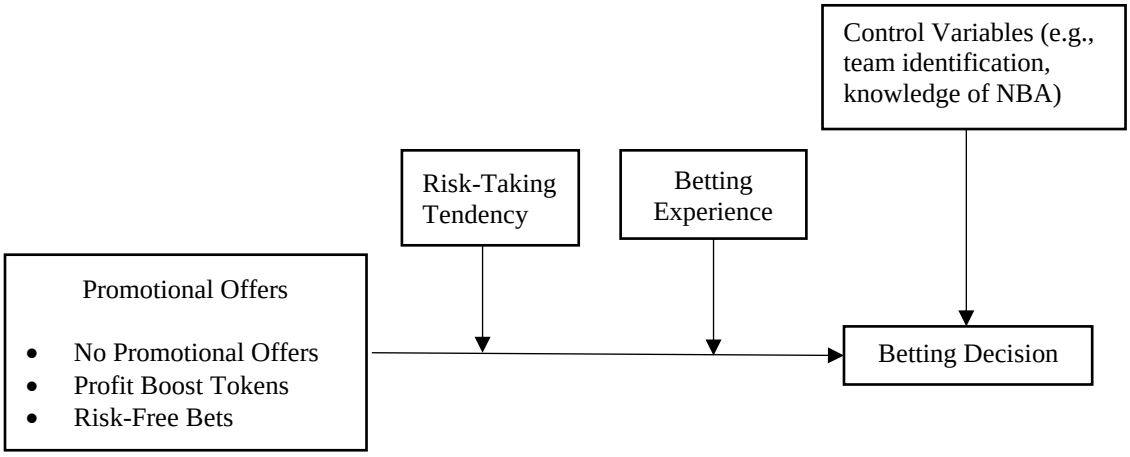


1.5.2 Study 2 – Promotional Offers, Sports Bettor Characteristics, and Decision Making in Sport Betting

After exploring the effect of betting odds in Study 1, Study 2 focuses on promotional offers on sportsbooks and aims to examine how two common types of promotional offers (i.e., profit boost token, risk-free bets) influence sports bettors' decision making and risk-taking levels. This study draws on framing effect in Prospect Theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981; Tversky & Kahneman, 1992) and views promotional offers as gambling promotional messages that frame the decision problem differently and lead to inconsistent actions. Furthermore, individuals differ in their risk-taking behavior (Bromiley & Curley, 1992; Kowert & Hermann, 1997) and respond to gambling promotions differently (Lamont et al., 2016; Thomas et al., 2012). Study 2 investigates whether the effect of promotional offers depends on sport bettor characteristics and examines sport bettor characteristics as a moderating variable. The study looks at two sport bettor characteristics: risk-taking tendency and betting experience. This study uses a three-level between-subjects experimental design to explore the interaction effect of promotional offers and sport bettor characteristics on sport bettors' risk-taking levels when they bet on the alternative spread of a sporting event. A moderation model with two moderators (Figure 1.2) was tested. Study 2 aims to further our understanding of the effect of gambling promotional offers on risk-taking levels of sport bettors with varying characteristics.

Figure 1.2

Conceptual Model of Study 2



1.5.3 Study 3 – The Role of Emotion in Sport Betting Decision Making

Emotion (e.g., excitement) drives behavior (Loewenstein et al., 2001) and motivates sport bettors to place a bet (Killick & Griffiths, 2022b). People like to make decisions that are emotionally satisfying, and the direction of behavior could be mediated by their emotional feelings (Kirkpatrick & Epstein, 1992). In addition, gambling is an emotionally involved activity (Bran & Vaidis, 2019). Study 3 replicates and extends Study 2 by examining whether emotional states during decision making explain how promotional offers and risk-taking tendency impact sport bettors' risk-taking levels when they bet on sports. This study uses an experimental design and tests a mediated moderation model in which risk-taking tendency serves as a moderator in the relationship between promotional offers and risk-taking, and this moderation is further mediated by emotional states during decision making. The positive emotion tested in the model is *joviality*, while the negative emotion tested is *fear*. Study 3 aims to advance our understanding

of the role of emotional states in risk decision making and the underlying mechanism of risk-taking under the effect of gambling promotions.

Figure 1.3

Conceptual Model of Study 3

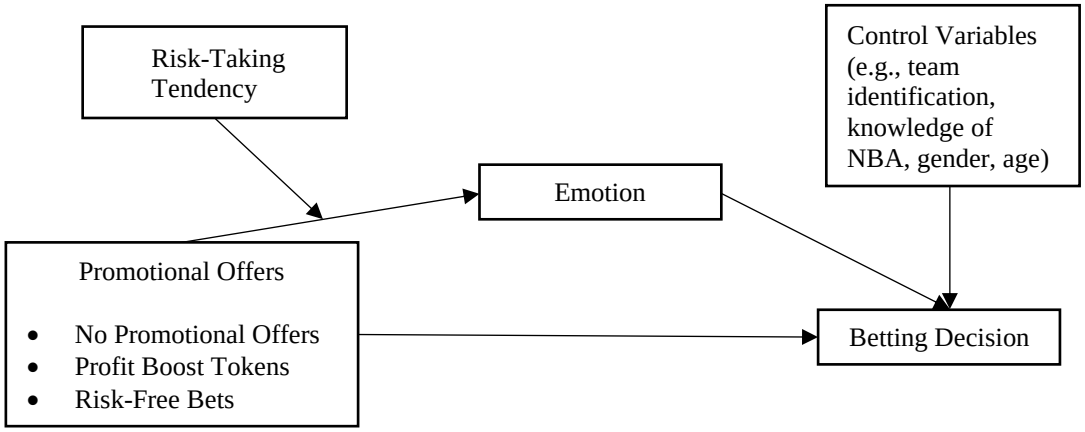


Table 1.1

Overview of Dissertation

Section	Title	Aim
Chapter 1	Introduction	Provide background, motivation, and contribution of this dissertation and lay out structure of three studies
Chapter 2	Study 1: Play the Odds: An Experimental Investigation of the Effect of Betting Odds on Decision Making in Sport Betting	Explore how changes of betting odds affect sports bettors' decision making when they place a Moneyline or spread bet on NFL games
Chapter 3	Study 2: Promotional Offers, Sports Bettor Characteristics, and Decision Making in Sport Betting	Explore how promotional offers (i.e., risk-free bet and profit boost token) and sport bettor characteristics (i.e., risk-taking tendency and betting experience) affect sports bettors' risk-taking levels when they bet on the alternative spread of an NBA game
Chapter 4	Study 3: The Mediating Role of Emotion in Sports Betting Decision Making	Replicate and extend Study 2 by examining the mediating role of emotion (i.e., joviality and fear) in sport betting promotion and betting decision making
Chapter 5	Conclusion	Summarize important findings, contributions, and major limitations

1.6 Contribution of the Dissertation

The goal of this dissertation is to contribute to sport betting literature by examining different factors that can significantly influence sport bettors' decision making when they bet on sporting events. An experimental design was employed to investigate the effect of betting odds, promotional offers, individual differences, and emotional states during decision making, and the three studies revealed the interplay of these factors on betting decisions and bettors' risk-taking by creating real gambling scenarios. The studies also add to sport marketing literature by investigating the effect of two gambling promotional offers among different groups of customers and both joviality and fear during gambling consumption and in responses to gambling marketing. The results highlight the role of fear when sport bettors receive and utilize gambling promotions to make betting decisions. In addition, the findings of Study 1 advance our understanding of heuristic decision making through viewing betting odds as important heuristics in sport betting decision making and demonstrating the utilization of betting odds for betting opportunities. Study 2 and 3 viewed gambling promotional offers as marketing messages that frame betting decision problems differently (e.g., profit maximization vs. risk-taking) and incorporated individual differences and emotional states during decision making in framing effect. The findings of Study 2 and Study 3 provide interesting insights on personal characteristics in responses to framing effect in sport betting. For instance, low- risk takers exhibited more risk-taking when they reacted to no-risk framing (e.g., risk-free bets). Study 3 identifies the important role of emotional states (i.e., joviality and fear) in the betting process and risky decision making, and the results reveal that reduced fear during decision making explains the effect of gambling promotion on willingness to bet.

This dissertation has important practical implications. First, by testing promotional offers and sport bettor characteristics in a more controlled fashion, the findings provide sportsbooks with insight into the promotional offers they commonly used and suggest customized betting marketing that caters to different groups of customers. For example, an important finding in Study 2 and Study 3 was that higher winning promotions may work better among less experienced sport bettors. Understanding how gambling promotions are perceived and utilized differently based on audience characteristics can further improve the effectiveness of these promotions. The results also highlight the importance of enhancing audiences' emotional experience in gambling marketing (e.g., reducing fear and increasing joviality) to increase betting intention and expenditure. On the other hand, the findings of the studies inform gambling regulation authorities and related organizations to understand when sport bettors become more susceptible to gambling promotions and how their personal characteristics and emotions predict their betting behavior. The dissertation helps disentangle a complex nature of decision making under uncertainty by incorporating both marketer-controlled and individual factors into account. Lastly, the methodology of the studies provides future studies in sport betting with creative and feasible tools to create a more realistic gambling scenario in experimental design to capture bettors' decision making and emotional reactions (Morales, Amir, & Lee, 2017).

1.7 Research Funding for Data Collection

This dissertation was supported by a Rackham Graduate Research Grant and the Lucile M. Swift Honor Award. The fundings were used to recruit participants on Prolific and to pay participant incentives.

Chapter 2 Play the Odds: An Experimental Investigation of the Effect of Betting Odds on Decision Making in Sport Betting (Study 1)

2.1 Introduction

Study 1 is an exploratory study that is interested in betting odds and decision making when sport bettors place a bet on sporting events. Sportsbooks in the U.S. offer different types of bets. In a sportsbook, games are usually presented with three different types of bet: point spread, total, and Moneyline (Santaromita, 2022). In Study 1, I focus on two common types of bets: Moneyline bets and spread bets. A Moneyline wager is betting on who will win the game. It is the most basic wager in sport betting (Santaromita, 2022). Betting on the point spread is wagering on a certain amount of points a team will win or lose by. Point spread bets typically have betting odds close to even money (e.g., -110), while Moneyline bets have a wide range of odds as the two teams in the matchup may not be evenly matched in terms of their competitive strength (Santaromita, 2022). One of the spread betting strategies is to track and exploit line movement (Thompson, 2022). For example, if a large amount of money is wagered on the favorite, sportsbooks might shift the point spread to balance betting action. The spread of the underdog will increase and the underdog can lose the game by more points, which seems an opportunity to bet on the underdog spread (Thompson, 2022). Since sportsbooks offer Moneyline and point spread bets together for a game, and sport bettors can consider both bets at the same time when they wager on the outcome of a game, Study 1 examines the effects of Moneyline and point spread odds on sport bettors' choice of bets by utilizing actual NFL playoff games.

Betting odds play an important role in sportsbook operations and sport bettors' decision making (e.g., D'Astous & Gaspero, 2015; McGrath & Pempus, 2022). I draw on heuristic decision making and view betting odds as an important heuristic in decision making in sport betting. In particular, betting odds can change constantly, and Study 1 uses an experimental design to manipulate betting odds and explore how changes of betting odds affect sports bettors' decision making when they place a Moneyline bet or a point spread bet on three NFL playoff games. Sportsbooks usually engage in line movement to adjust betting odds in response to betting action or offer promotional odds (e.g., odds boost) that cause betting odds changes. Therefore, I manipulated betting odds by simulating two situations: line movement and promotions, and explored how sport bettors adjusted their bets on the teams' Moneyline and point spread under two situations when betting odds changed. Sport bettors might be influenced by promotional odds that offer higher payouts and bet on the boosted Moneyline odds. They may also scrutinize the betting odds and identify betting opportunities such as increased underdog spread or increased underdog Moneyline in a close match-up.

Study 1 contributes to sport betting literature by exploring betting odds as important heuristics in decision making. This study manipulated betting odds through line movement and promotional offers and provided insight on how changes of betting odds can shift sport bettors' decisions on Moneyline bets and spread bets and their choices of higher payouts versus safer betting options under different situations. Betting odds changed through promotional offers could lead to more wagering on the boosted odds for higher payouts, while safer betting option (e.g., increased underdog spread) existing in line movement was viewed as another appealing opportunity for sport bettors to wager on. The results suggest that sport bettors can scrutinize betting odds to identify betting opportunities. This study also encourages future research on

exploring how line movement changes bettor's decisions including both Moneyline bets and point spread bets. In addition, this study contributes to sport marketing literature by investigating how odds-related gambling promotional offers could enhance sport bettors' betting expenditure and willingness to bet.

Study 1 also advances our understanding of heuristic decision making and decision making under uncertainty by exploring how betting odds as heuristics guide betting decisions in sport betting. Although previous studies have debated the utility and effectiveness of heuristic decision making and criticized the reliance on betting odds for deteriorating gambling performance (D'Astous & Gaspero, 2015), the findings of this study suggest the utilization of heuristics in the context of sport betting is unavoidable and highlight that the usage of betting odds can facilitate identification of betting opportunities in decision making. Reliance on heuristics may encourage the pursuit of higher payouts, but it may also help discover safe bets (i.e., bets that have a high probability of winning or low risk of losing) as an opportunity to win. Consistent with what Gigerenzer and Gaissmaier (2011) proposed, decision making under uncertainty typically involves heuristics, and decision makers should learn how to use heuristics adaptively and effectively to form decisions.

The findings of the study shed new empirical insights on how sport bettors utilize betting odds and promotional offers to form betting decisions, which has important marketing as well as policy implications. As suggested in previous studies, sport bettors tend to be attracted and triggered by better odds promotional offers and see these offers as an opportunity to increase profits. Current studies also suggest that sport bettors would look for safe bets existing in the betting market and view them as an opportunity to win. Safe bets could be more appealing to customers than risky choices with higher payouts. These insights into how sport bettors discover

opportunities through observing betting odds and adjust their betting choices can help formulate sportsbook operation strategies. The gambling regulation authority and related organizations also gain a better understanding of the potential harm of odds-related promotions and the importance of responsible marketing standard to enhance customer protection in the betting market.

2.2 Literature Review

2.2.1 Betting Odds in Sportsbook Operations

Setting betting odds is crucial in sportsbook operations, and sportsbooks are utilizing betting odds to influence bettors' behavior and generate higher profits. First, when betting action is imbalanced, sportsbooks may engage in line movement, which is adjusting betting odds and lines to incentivize bettors to take a certain side or discourage bettors from placing wagers on a certain side (McGrath & Pempus, 2022). Oddsmakers do not evaluate the outcome of a game, but monitor and predict the opinion of the gambling public and set odds and move the betting lines accordingly (Cantinotti et al., 2004). Researchers also found that sportsbooks take advantage of unconscious biases generated by betting odds to maximize profit (Levitt, 2004). Cognitive bias in the betting market guide setting of betting odds (Wheatcroft, 2020). For example, sportsbooks tend to offer better value odds on favorites and poor value odds on longshots (Cain et al., 2000). They would also set betting lines using and exploiting bettor bias in the market to earn higher profits rather than using the balanced book model (Humphreys, 2010; Humphreys, 2011; Humphreys et al., 2014). Some sportsbooks are also willing to offer inefficient odds for business reasons and maximize long-term profit (Kuypers, 2000). For example, sport bettors like to shop around different sportsbooks for the best odds and payouts, and sportsbooks would offer competitive and better betting odds to attract sport bettors to choose

and bet on the sportsbooks (Boniface et al., 2012; Tak et al., 2018). Thus, bettors never know the true odds (Woodland & Woodland, 1991).

In addition, promoting betting odds is a frequently used marketing technique for sportsbooks. Research found that sportsbooks include and emphasize betting odds in betting advertising and promotions to enhance betting intention and increase betting expenditure (e.g., Browne et al., 2019; De Jans, 2022; Rockloff et al., 2019). For instance, De Jans (2022) found that digital betting advertising including betting odds leads to more positive responses and higher betting intentions. Sports-embedded advertising and promotions that display live betting odds and show good odds available also influence bettors' behavior including betting frequency, expenditure, impulsivity, and problem gambling severity (Hing et al., 2014a, 2014b, 2015a, 2017c; Thomas et al., 2012; Xu et al., 2021). Promotional offers including attractive and better odds (i.e., betting odds that provide higher payouts when the probability of an outcome is not decreased) are one of the most common and popular inducements, which can result in the placing of impulsive and riskier bets (Browne et al., 2019; Hing et al., 2016b, 2018a, 2019b; Houghton et al., 2019; Killick & Griffiths, 2022b; Lopez-Gonzalez et al., 2017a; Newall et al., 2019; Rockloff et al., 2019). For example, Rockloff et al. (2019) found that better odds/winnings are the most attractive inducement, and bettors select longer odds bets when an inducement is present. Longer odds refer to higher numerical values and the situation where the probability of an outcome occurring is perceived to be lower by bookmakers. Choosing longer odds with promotional offers increases potential returns, which in fact results in more bettors in a losing position.

Therefore, sportsbooks usually manipulate betting odds to affect bettors' decisions through line movement or promotional offers. To date, limited research has delved into the decision-making process of sport bettors when faced with changes in betting odds through both

line movement and promotional offers, which are two common factors that cause betting odds change and prompt sport bettors to adjust their betting decisions even when the game information or uncertain nature of the game does not change. It is possible that in response to fluctuations in betting odds, sport bettors would identify better betting options (e.g., safer bet or higher pay) in the changed betting lines or bet on the boosted odds for higher profits. In Study 1, I conducted three experiments aimed at manipulating betting odds through simulations of line movement and promotional offers, and this series of experiments sought to understand how bettors' decision-making of Moneyline and spread wagers evolves under these two common situations in sportsbook operations. The results also aim to provide an enhanced understanding of the utilization of betting odds. Comparing betting decisions across two scenarios can help understand how sport bettors leverage betting odds as one of the accessible heuristics in the betting decision-making process to identify betting opportunities and make decisions. Therefore, Study 1 is an exploratory study and answers the following research questions:

1. How do changes of betting odds through line movement alter decisions on Moneyline and spread bets for a game?
2. How do changes of betting odds through odds boost promotional offer alter decisions on Moneyline and spread bets for a game?

2.2.2 Betting Odds in Decision Making

Betting odds help bettors identify the favorite and the underdog in a match and reach a betting decision quickly. However, odds-implied probabilities could be inaccurate by random chance as well as mispricing of the odds (Wheatcroft, 2020). Previous research has shown that betting odds could be unreliable information that leads to biases (e.g., Paul & Weinbach, 2005; Wheatcroft, 2020), inefficiency in the sport betting market (e.g., Golec & Tamarkin, 1991), and

poor betting performance (D'Astous & Gaspero, 2015). For example, Killick & Griffiths (2022b) found that good or better odds enhance feelings of control and winning, reduce rational thinking, and motivate sport bettors to place a bet. D'Astous & Gaspero (2015) found that using betting odds to form decisions has a negative impact on betting performance and winnings. Betting odds is an important source of cognitive bias and irrational decisions. On the other hand, sport bettors are learning how to scrutinize betting odds changes to identify winning opportunities (e.g., Thompson, 2022). Betting odds are crucial information that helps bettors exploit value in sport betting. Previous research has found that informed bettors utilize betting odds, shift in the spread, and distortion in the betting market to secure positive returns (Francisco & Moore, 2019; Killick & Griffiths, 2021; Krieger et al., 2021; Mani, 2018; Paul & Weinbach, 2008). Some studies also identified profitable betting strategies such as an underdog betting strategy (e.g., Francisco & Moore, 2019; Ryan et al., 2012; Sauer, 1998). Thus, betting odds do not always result in irrational decision making; instead, they can support betting strategies and create opportunities for winning.

Considering betting odds is essential and inevitable in forming betting decisions, since betting odds determines final payouts and reveals important information (McGrath & Pempus, 2022). Previous studies have identified the important role of betting odds in sportsbook operations and betting decision making. A more profound understanding of the utilization of betting odds can enhance our knowledge of how sport bettors make decisions. To date, less is known about how changes of betting odds influence bettors' Moneyline and point spread wagers on sporting events, which are two of the most basic wagers in sport betting, and their choices of higher payouts versus safer bets. The changes of betting odds could alter bettors' wagers on the winning or point spread of a certain athlete or team, potentially leading them to opt for bets that

provide better payouts or low risk. Therefore, participants in the experiments were asked to place a Moneyline wager or a points spread wager on an NFL game, and this study aims to explore how line movement and odds boost promotions prompt sport bettors to adjust their Moneyline and spread wagers for potential higher payouts or safer bets. Study 1 draws on heuristic decision making and views betting odds as important heuristics in betting decision making that can be leveraged to decide the choice of bets on a game.

2.2.3 Heuristic Decision Making in Sport Betting

2.2.3.1 The Positive and Negative Aspects of Heuristic Decision Making

"A heuristic is a strategy that ignores part of the information, with the goal of making decisions more quickly, frugally, and/or accurately than more complex methods (Gigerenzer & Gaissmaier, 2011, p. 454)." When individuals assess the probability of uncertain events and form decisions under uncertainty, they rely on a limited number of heuristics to reduce complex tasks and form decisions quickly (Tversky & Kahneman, 1974). One major component in sports competitions is uncertainty of the competition outcome. To predict an outcome and place a sport bet, sport bettors can collect and analyze relevant information such as team or player statistics. However, it could be very difficult to consider and analyze all relevant factors when predicting the outcome of a game, especially when the game involves high uncertainty or when sport bettors have time constraints. Therefore, sport bettors may have to rely on available information and heuristics such as betting odds to simplify the tasks of making betting decisions. For example, sport bettors may bypass analytical thinking and turn to an easier question, such as which bet selection has higher payouts or which team is the favorite.

When people bet on sports, betting odds are presented alongside betting options and they are one of the readily available information for sport bettors without requiring additional effort to

obtain. Betting odds are one of the shortcuts that bettors can use to make quick and easy decisions and reduce complex tasks of placing a bet. Although betting odds are quantitative estimates that can represent the probability of a specific outcome and determine final payouts, this study uses the definition of heuristics by Gigerenzer and Gaissmaier (2011) and views betting odds as important heuristics in betting decision making. As discussed earlier, betting odds can provide bettors with readily available and simplified information that helps them evaluate the outcome, potential risks, and reward of placing a bet. This enables them to quickly and frugally reach betting decisions with less cognitive effort. Meanwhile, it is important to note that betting odds may be unreliable and lead to errors. Through using betting odds, some sport bettors may also ignore other collectable or analyzable information that can assist them place a bet but requires more cognitive effort. In addition, D'Astous & Gaspero (2013) argued that using betting odds represents a common way to reach a decision easily and quickly, and the authors measured the use of bookmaker odds as heuristic processing.

Since reliance on heuristics reduces complex tasks and saves efforts, heuristic decision making is usually thought to imply greater systematic errors, misperception of probabilities, and biases (Tversky & Kahneman, 1974) and is negatively related to rational thinking style (Pacini & Epstein, 1999). Gamblers tend to misapply heuristics such as luck, divine intervention, or inappropriate underlying principles in decision making that generate fallacious beliefs and risky behavior (Armstrong et al., 2020). However, individuals are still prone to utilize certain heuristics, especially when they have time constraints or when the task is cognitively difficult (Risen, 2016). On the other hand, heuristics are unavoidable aspects of human thought and decision making (Griffin et al., 2001). Some authors critique the heuristics-and-biases program (e.g., Gigerenzer, 1996) and argue that heuristics can be more efficient and accurate than more

complex strategies in an uncertain world (Gigerenzer & Gaissmaier, 2011). In decision making, efficiency refers to the ability to achieve a desired outcome by utilizing available resources effectively and avoiding unnecessary waste of resources, such as time and effort. Using heuristics is not a result of too little thought but a result of thinking in quick and natural ways (Kahneman & Varey, 1991). Gigerenzer and Gaissmaier (2011) suggested that decision making under uncertainty typically involves heuristics, not only because it saves time and effort, but also because rational models rarely hold in an uncertain world. In addition, a heuristic is not rational or irrational (Gigerenzer & Gaissmaier, 2011). The effectiveness of heuristic decision making depends on the structure of the environment. Individuals and organizations should learn to use and apply heuristics in an adaptive way and select the proper heuristics to form decisions. Furthermore, heuristics and rules can combine, and decision making can involve both heuristic assessments and logical arguments (Griffin & Tversky, 1992).

2.2.3.2 Heuristic in Gambling

Gamblers tend to use a simple heuristic-based strategy (e.g., the odds of winning), overreact to heuristics, and overvalue available information (Mani, 2018; Wheatcroft, 2020). The heuristic approach helps to explain and predict phenomena in gambling (Griffin et al., 2001). Kirkpatrick and Epstein (1992) measured college students' choice between two gambles with equal odds. Participants were given the option to play a lottery with a 10:100 chance of winning or with a 1:10 chance. The researchers placed 10 winning tickets and 90 losing tickets in a large tray and placed 1 winning ticket and 9 losing tickets in a small tray. Although the gambles were equivalent, the students tended to choose the large tray with more winning targets and justified their decision by the greater number of winners in the 10:100 gamble. Students who preferred one gamble to an equivalent one bypassed analytical processing and relied on heuristic

processing, which caused ratio-bias (Kirkpatrick & Epstein, 1992). Amsel (2009) replicated the study and found similar patterns. The author found only a minority of the participants understood that there was no preference, and the choice of the large tray elicited more irrational judgment. Alonso and Fernandez-Berrocal (2003) extended the study and added two rations (2:10, 3:10) in their experiments. They found participants made irrational decisions preferring the 10:100 option to 2:10 and 3:10. Heuristics are mental shortcuts to form judgments, which can provide a fast and efficient means for decision making, but can also generate biases in gambling (Armstrong et al., 2020).

In sport betting, people can use different thinking styles and information processing to inform decisions. On the one hand, sport bettors can effortfully collect and analyze information including team statistics, player statistics, and other relevant factors to predict the outcome of a game and place a bet. On the other hand, sport bettors can rely on intuition or heuristics such as betting odds or potential payouts to form betting decisions. To minimize cognitive efforts under high uncertainty, sport bettors tend to engage in heuristic decision making. For example, they can consider a team's historical performance, personal preferences, or betting promotions (e.g., Woodland & Woodland & Woodland, 2015; Killick & Griffiths, 2022a) without too much thinking. A study found that bettors' intuition drives them to bet on the favorite rather than the underdog (Risen, 2016). When the situation becomes more complicated, for example, to bet on whether or not the favorite will beat the spread, people seem to rely stronger on their intuition (Joyce, 2007). The favorite usually loses against the spread, but people continue to rely on what they intuitively feel to be true and bet on them (Simmons et al., 2011). D'Astous & Gaspero (2013) found that using betting odds (i.e., heuristic processing) to form betting decisions has a negative effect on returns, while analytical processing (i.e., analysis of team performance)

improves gambling performance (i.e., return on investment). When participants have time constraints in placing their bets, they use heuristic processing and take the favorite against the point spread more frequently, and therefore, sportsbooks promote new gambling features such as live in-play betting to push sport bettors to make decisions quickly and facilitate heuristic processing (D' Astous & Gaspero, 2015; Walker et al., 2019). Lack of rational thinking and greater intuitive thinking can lead to fallacious gambling beliefs, risky decision making, and excessive gambling consumption (Armstrong et al., 2020; Visintin, 2020).

Thus, sportsbooks target heuristics among sport bettors and implement advertising strategies such as promoting long odds or complex bets with high payouts during the game (Newall, 2015). Odds-related gambling promotional offers could induce heuristic processing, especially when outcomes are difficult to predict. For example, some betting companies offer "Odds Boost" so that participants can receive better odds and higher winnings (i.e., increased profit upon winning) when they bet on certain outcomes. Bettors are likely to be stimulated to bet and make decisions by promotional offers (Hing et al., 2015a; Rockloff et al., 2019). Killick & Griffiths (2022b) found that promotions that advertise attractive odds decrease feelings of risk and increase perceptions of winning, motivating sport bettors to place a bet without careful reflection and analysis. Participants in the study shared (Killick & Griffiths, 2022b, p.807):

> *It's the boosts that get me. Those price boosts. They're the devil.*
>
> *So, you see what the odds were, and what they are now and then it just clouds your judgment because suddenly you're playing the odds, not what you think will actually happen. Because they're just up there, in yellow and it's like 'here's the boost' and it always sways my bet a bit.*

These odds-related promotions induce greater heuristic processing, so that sport bettors focus more on the betting odds rather than rationally think about the game itself and the outcome when they place a bet. Bettors trade on noise rather than making decisions based on actual

fundamentals (Woodland & Woodland, 2015). Using heuristic decision making when promotional offers are provided, sport bettors are more vulnerable to cognitive biases and irrational decision making, which can lead to serious gambling-related issues (Browne et al., 2016; Killick & Griffiths, 2022b; Rockloff et al., 2019).

However, as sport competitions typically involve uncertainty of outcome, rational and analytical thinking do not guarantee winnings in sport betting. Also, as discussed earlier, using heuristic decision making and betting odds to form betting decisions may not always lead to irrational decision making and negatively impact betting behavior and performance. Betting odds can be important information to scrutinize and analyze in decision making. Professional bettors are utilizing betting odds and line movement to form winning strategies and secure positive returns (Krieger et al., 2021; Mani, 2018; Paul & Weinbach, 2008; Ryan et al., 2012). For example, research found that betting against first movement to favorites and betting with last movements to underdogs can generate profits (Paul & Weinbach, 2008). Also, tracking line movement can understand informed bettors' actions and explore winning opportunities (Thompson, 2022). Although using betting odds represents a common way to reach a decision easily and quickly (D'Astous & Gaspero, 2013), using betting odds cannot simply be considered as heuristic processing that deteriorates gambling performance. Through exploring how sport bettors shift their Moneyline and spread wagers according to betting odds changes in the line movement and promotion scenarios, this study aims to explore diverse aspects of using heuristics in the dynamic and uncertain sport betting world. In the current study, sport bettors may be attracted to better odds or identify low-risk betting opportunities by using heuristics in the decision-making process, and the results can enhance our understanding of the utilization of heuristics in gambling.

2.3 Methodology

2.3.1 Study Design, Stimuli, and Expected Results

To examine if changes of betting odds affect betting decisions, I employed an experimental design and manipulated betting odds through line movement and promotional offers (i.e., odds boost). The experiments were conducted online by using Qualtrics. I selected three NFL playoff games in the 2022-2023 NFL season to create real gambling scenarios, and the playoff games were relatively close games that can create uncertainty. To confirm the success of the manipulation, I first conducted a pilot study (N = 119) using the NFL divisional game (Dallas Cowboys vs. San Francisco 49ers). After confirming the betting odds manipulations were successful, I proceeded to the main study and used two games, the conference championship game (Cincinnati Bengals vs. Kansas City Chiefs) and the Super Bowl LVII (Kansas City Chiefs vs. Philadelphia Eagles) and collected separate data sets from each game. I repeated the same experiment procedure with three NFL games and the goal was to replicate the study to see if the betting odds effect is reproducible.

The experiments used a 3-level between-subjects design and had three experimental conditions (See Appendix B). The betting odds in three experimental conditions were manipulated as seen in Table 2.1, Table 2.2, and Table 2.3. As seen in Table 2.1, in the control condition, participants saw normal Moneyline (e.g., +155, -190) and spread (e.g., 3.5) posted by BetMGM; in the promotion condition, I added a 100% odds boost and boosted the underdog Moneyline odds, which is often offered by some online sportsbooks such as DraftKings and FanDuel. Participants saw “Odds Boost!” promotional message with the normal odds being crossed out and the promotional odds of the underdog (e.g., +333). The odds of the favorite and the point spread of the game remained the same, so the only difference from the control

condition was the increased betting odds of the underdog (from +155 to +333); in the line movement condition, I set the same odds for the underdog as those in the promotion condition. The betting odds of the underdog were increased to match the boosted odds (e.g., +333) in the promotion condition, without providing an odds boost. To stimulate line movement, changes were made to the betting odds of the favorite (e.g., -450) and the point spread (e.g., 8.5) of the game, utilizing the point spread to Moneyline converter for NFL. This setup allowed us to observe how participants' decisions may shift to higher-pay option or safer bets when the betting line changed, compared to when the odds boost promotion was offered.

Table 2.1

Moneyline and Point Spread of the Pilot Study

	Control Condition	Line Movement Condition	Promotion Condition
Dallas Cowboys	Moneyline: +155	Moneyline: +333	Moneyline: +333
	Spread: +3.5 (-110)	Spread: +8.5 (-110)	Spread: +3.5 (-110)
San Francisco 49ers	Moneyline: -190	Moneyline: -450	Moneyline: -190
	Spread: -3.5 (-110)	Spread: -8.5 (-110)	Spread: -3.5 (-110)

Note. Highlighted numbers indicate manipulated odds different from the control condition. The betting odds in the parentheses are odds on the point spread.

Table 2.2

Moneyline and Point Spread of Main Study (Game 1)

	Control Condition	Line Movement Condition	Promotion Condition
Cincinnati Bengals	Moneyline: -105	Moneyline: +200	Moneyline: +200
	Spread: +1 (-110)	Spread: +5.5 (-110)	Spread: +1 (-110)
Kansas City Chiefs	Moneyline: -115	Moneyline: -250	Moneyline: -115
	Spread: -1 (-110)	Spread: -5.5 (-110)	Spread: -1 (-110)

Note. Highlighted numbers indicate manipulated odds different from the control condition. The betting odds in the parentheses are odds on the point spread.

Table 2.3

Moneyline and Point Spread of Main Study (Game 2)

	Control Condition	Line Movement Condition	Promotion Condition
Kansas City Chiefs	Moneyline: +105	Moneyline: +200	Moneyline: +200
	Spread: +1.5 (-110)	Spread: +5.5 (-110)	Spread: +1.5 (-110)
Philadelphia Eagles	Moneyline: -125	Moneyline: -250	Moneyline: -125
	Spread: -1.5 (-110)	Spread: -5.5 (-110)	Spread: -1.5 (-110)

Note. Highlighted numbers indicate manipulated odds different from the control condition. The betting odds in the parentheses are odds on the point spread.

Data collection started four days before each of the game and stopped prior to the start of the game. I chose a four-day window before the game to avoid drastic odds changes that would impact the results and at the same time collect a sample size that had statistical power. During data collection, the betting odds and lines of the games remained steady.

In the line movement condition, I set the odds of the underdog Moneyline as the same as the one boosted in the promotion condition. Findings can reveal whether bettors reach higher-pay versus safer decisions facing different situational cues when the same betting option is provided. In addition, in the line movement condition, the spread was increased to 8.5 or 5.5, and could occur due to injury, lineup changes, or other relevant information. Although it did not happen before the game and it is possible that participants felt the odds and lines were not what they should be in the experiments, sport bettors may have these feelings in real betting and they can still decide to place the bet and utilize the betting lines to maximize their winnings. The purpose of using experimental design was to manipulate betting odds and see how the odds boost promotion and the changed betting lines shifted bettors' choice of bets.

During the data collection timeframe, the betting odds and lines remained steady, which means that the implied probability of the outcome did not change. In the line movement

condition, the wider odds margin can significantly impact the bettors' decision. First, the wider odds margin can lower perceived outcome uncertainty and imply a more certain outcome of the game. Some participants may perceive a strong favorite in the game and bet on the favorite. In the current dataset, participants have watched NFL games and have placed bets on NFL games before, and they may have good knowledge of the NFL and could identify the games as close matchups. With a wider odds margin, betting on the underdog spread means that the underdog can lose the game by more points with the same betting odds. For example, betting on the Dallas Cowboys spread, the team needs to lose by less than 4 points in the control condition, while the team can lose by less than 9 points in the line movement condition with the same betting odds. Participants may identify the underdog spread as an opportunity to place a safe bet and win. On the other hand, some participants may identify the underdog Moneyline odds as better odds than what it normally would be and an opportunity to win more money, although it is riskier than the underdog spread. Thus, participants may be likely to bet on the underdog spread or underdog Moneyline in the line movement condition. This study explores how the choice of bets shifts in this condition and whether participants choose a safer bet or a riskier betting option. Regarding the promotion condition, as proposed in previous studies, participants may be attracted to the odds boost promotion and more likely to bet on the boosted odds to obtain higher payouts.

One limitation of the stimuli design is that in the promotion condition, participants saw the visual of the promotional offer and the changes of betting odds at the same time, and the promotion visual seemed exciting and could prompt sport bettors to take the boosted odds. In the line movement condition, the underdog Moneyline odds was the same value as in the promotion condition but was not accompanied with the promotion visual. The promotion visual in the promotion condition could have an effect and should be further examined in future studies.

Another limitation is that the line movement condition had a wide odds margin since the experiment only has three conditions, and I set the same underdog Moneyline odds in two of the experimental conditions to explore the effect of heuristics. Sportsbook operators typically move betting lines in a small amount before the game, and lower odds margin and shift of betting choices should be further examined in future studies. Additionally, I chose playoff games that involved high uncertainty to test the effect of betting odds, and games with varying levels of outcome uncertainty may exhibit different patterns. For example, the role of betting odds might be less important in the games with less uncertainty.

2.3.2 Participants and Procedures

The sample size of the pilot study was 119. In the main study, the sample sizes of the two data sets were 405 and 432, respectively. In all three sets of data collection, the same procedures were used. I recruited participants through Prolific by offering $1.05 as compensation. Participants only received participation fees in the studies and did not receive payouts for their bets. I recruited participants who have consumed NFL content and have placed bets on American football before. I first used Prolific demographic prescreening filters to only allow participants who are living in the U.S., older than 21, watching American Football/NFL, and participating in sportsbooks and sports betting to be eligible to participate in the study. I also included prescreening questions in the survey to validate the prescreening filters. I did not screen out participants who reside in the states where sports betting was not legal at the time of completion, since participants did not receive payouts from their wagers.

In all three samples, participants were told that the researcher was interested in sport consumer behavior and decision making in sport betting. They first answered two prescreening questions: (1) Do you watch NFL / American football regularly and (2) Have you placed a bet on

any NFL games before? If participants failed the prescreening questions, the survey was ended. Next, participants reported their betting behavior, including their familiarity and experience with sport betting and NFL, team identification with the teams in the experiment, betting frequency, betting expenditure, and betting apps used most frequently.

After completing the betting behavior questions, participants read the betting instructions (see Appendix A) and were randomly assigned to one of the three betting odds conditions (see Appendix B). Participants were instructed to view the betting odds of the NFL game and place a single bet (either a Moneyline bet or a point spread bet) on the game. For example, in the pilot study, participants can select one option from the Dallas Cowboys Moneyline, San Francisco 49ers Moneyline, Dallas Cowboys spread, and San Francisco 49ers spread. Participants were also asked to indicate their willingness to make the wager they just saw and the maximum units they were willing to wager. At the end of the questionnaire, participants provided their demographic information and were debriefed at the end of the survey that the betting odds were created by BetMGM and the researcher and prepared only for research purposes. The same procedures were implemented in the main study.

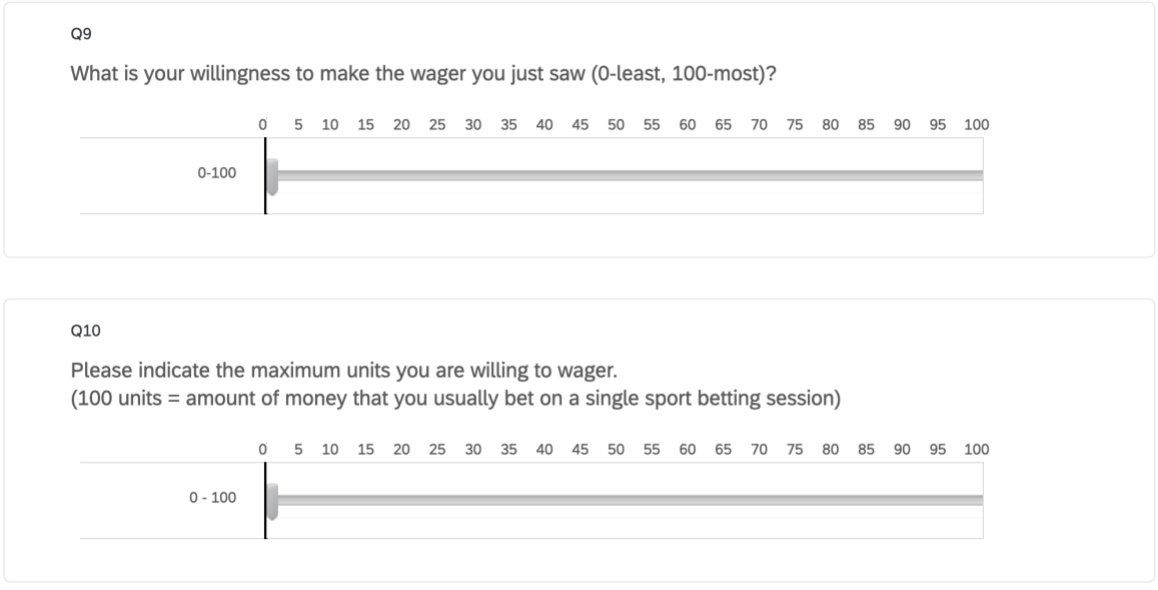
2.3.3 Measures

Betting decisions were measured in the study, including betting selection (‘please place your bet selection’), willingness to bet (‘What is your willingness to make the wager you just saw’; 0 – 100), and betting units (‘Please indicate the maximum units you are willing to wager: 100 units = the amount of money that you usually bet on a single sport betting session’; 0 – 100). The primary interest in this study was participants’ betting selection on the NFL games. In addition, previous betting literature looks at bettors’ likelihood of betting (Hing et al., 2017b), desire to bet (Lole et al., 2020), and betting expenditure (e.g., Browne et al., 2019; Hing et al.,

2019a) when investigating betting behavior. Therefore, I measured sport bettors' willingness to place the bet and betting units to indicate and provide insight into sport bettors' decisions when they bet on the NFL games. Willingness to bet and betting units were measured by sliders (Figure 2.1). Previous betting behavior, team identification, and demographic measures are detailed in Appendix F. Measures of betting frequency and betting expenditure were adapted from previous sport betting studies (e.g., Browne et al., 2017; Moore & Ohtsuka, 1997; Russell et al., 2019) to measure how often participants bet on the NFL and how much they usually spend on one sport bet. Team identification with the teams was measured with three items (e.g., "being a fan of Kansas City Chiefs is very important to me") adapted from the Sport Spectator Identification Scale developed by Wann and Branscombe (1993). Familiarity questions were adapted from Brucks' (1985) Subjective Knowledge Scale. Familiarity questions asked if participants were familiar with sport betting, point spread, Moneyline, betting on the NFL, and the NFL, which were important elements in the betting task.

Figure 2.1

Willingness to Bet and Betting Units Measures



2.3.4 Data Analysis

The three dependent variables analyzed in this study were betting selection, willingness to bet, and betting units. To test if betting selection was significantly different across three conditions, I performed a Pearson's chi-square test with R Studio. In the experiments, participants were asked to select one of the four betting options, namely, the Moneyline and spread for each of the two teams. Betting selection was a categorical variable with four levels. The independent variable, betting odds, was a categorical variable with three levels. Pearson's chi-square test can be used to test the relationship between two categorical variables by comparing observed frequencies to model expected frequencies and determine the size effect with the odds ratio (Field et al., 2012). I also performed chi-square tests to compare the betting selections between conditions (e.g., control condition vs. promotion condition).

The other two dependent variables, willingness to bet (i.e., participants' willingness to place the bet) and betting units (i.e., the maximum units that participants were willing to wager) were both continuous variables. To examine the effect of betting odds on willingness to bet and betting units, I used dummy coding to convert betting odds into two dummy variables for line movement and promotion with the control condition serving as a reference group. Dummy coding can convert a categorical variable into a series of dichotomous variables. There were three conditions in the experiments. The control condition was coded as the reference group (0, 0), to which the other two levels (i.e., line movement condition and promotion condition) were compared. The line movement condition was coded as (1, 0). The promotion condition was coded as (0, 1). I conducted linear regressions, controlling for betting behavior (e.g., betting expenditure). By using dummy coding and linear regressions, I also examined the differences in willingness to bet and betting units between participants who chose different betting selections.

For example, when I compare willingness to bet (Y) between the three conditions, in equation (1), X = line movement condition (i.e., $D_1 = 1$ and $D_2 = 0$), and b_1 estimates the difference in the mean value of willingness to bet (Y) between line movement condition and control condition. When X = promotion condition (i.e., $D_1 = 0$ and $D_2 = 1$), b_2 estimates the difference in the mean value of willingness to bet (Y) between promotion condition and control condition.

$$Y = i_1 + b_1D_1 + b_2D_2 + b_3\text{cov} + e \quad (1)$$

2.4 Results

2.4.1 Sample Descriptions

In the pilot study (N = 119), the majority of the participants were male (89%) and Caucasian (76%). The average age was 39.15 (*SD* = 11.77). Participants were familiar with sport betting (*M* = 4.87, *SD* = 0.37), point spread (*M* = 4.74, *SD* = 0.67), Moneyline (*M* = 4.64, *SD* = 0.74), betting on the NFL (*M* = 4.89, *SD* = 0.35), and the NFL (*M* = 4.81, *SD* = 0.48). A five-point Likert scale was used to measure participants' familiarity. All the participants reported that they had used at least one online betting product or placed bets at local casinos. They considered themselves average experienced NFL bettors (*M* = 3.77, *SD* = 1.15). Forty-two percent of the participants indicated that they bet once a week or more, and 34% indicated that they bet more than once a month but less than once a week. Most of the participants (82%) indicated that they usually bet $6 - $100 on a single sport betting session. Team identification with the Dallas Cowboys (*M* = 1.77, *SD* = 1.21) and the San Francisco 49ers (*M* = 1.78, *SD* = 1.08) were low.

In the first dataset of the main study (N = 405), the majority of the participants were male (80%) and Caucasian (85%). The average age was 37.63 (*SD* = 10.65). Participants were familiar with sport betting (*M* = 4.8, *SD* = 0.41), point spread (*M* = 4.66, *SD* = 0.69), Moneyline (*M* =

4.47, *SD* =0.94), betting on the NFL (*M* = 4.78, *SD* = 0.49), and the NFL (*M* = 4.89, *SD* = 0.37). All the participants reported that they used at least one online betting product or placed bets at local casinos. They considered themselves average experienced NFL bettors (*M* = 3.55, *SD* = 1.03). Thirty-one percent of the participants indicated that they bet once a week or more, and 33% indicated that they bet more than once a month but less than once a week. Most participants (83%) indicated that they usually bet $6 - $100 on a single sport betting session. Team identification with the Cincinnati Bengals (*M* = 2.12, *SD* = 1.28) and the Kansas City Chiefs (*M* = 2.12, *SD* = 1.30) were low.

In the second dataset of the main study (N = 432), the sample showed similar demographic profiles from other data sets. The majority of the participants were male (88%) and Caucasian (82%). The average age was 38.28 (*SD* = 11.44). Participants were familiar with sport betting (*M* = 4.82, *SD* = 0.43), point spread (*M* = 4.75, *SD* =0.55), Moneyline (*M* = 4.63, *SD* = 0.78), betting on the NFL (*M* = 4.84, *SD* = 0.43), and the NFL (*M* = 4.74, *SD* = 0.53). Participants also had good knowledge of sport betting (*M* = 4.16, *SD* = 0.80), point spread (*M* = 4.16, SD = 0.90), Moneyline (*M* = 4.07, *SD* = 1.10), betting on the NFL (*M* = 4.21, *SD* = 0.82), and the NFL (*M* = 4.16, *SD* = 0.84). All the participants reported that they used at least one online betting product or placed bets at local casinos. 76% of the participants have bet on the Super Bowl last year (2022). They considered themselves average experienced NFL bettors (*M* = 3.56, *SD* = 1.03). Thirty-nine percent of the participants indicated that they bet once a week or more, and 26% indicated that they bet more than once a month but less than once a week. Most of the participants (81%) indicated that they usually bet $6 - $100 on a single sport betting session. Team identification with the Kansas City Chiefs (*M* = 1.95, *SD* = 1.25) and the Philadelphia Eagles (*M* = 1.88, *SD* = 1.23) were low.

2.4.2 Pilot Study Results

A chi-square test of independence was performed, and a significant association between betting odds and betting selections was found. The relation between betting odds and bet selection was significant, χ^2 (6, N = 119) = 19.14, p = .003. The betting selections significantly differed across three experimental conditions. As seen in Table 2.4, in the line movement condition, participants were more likely to bet on the Cowboys point spread (Cowboys +8.5). In the promotion condition, participants were more likely to wager on the Cowboys Moneyline, which is boosted by odds boost (Cowboys +333). The preliminary analysis showed that participants' betting selections were influenced by the change in the betting odds. I confirmed the success of the manipulation of betting odds and proceeded to the main study.

Table 2.4

Contingency Table of the Pilot Study (Full Sample)

	Betting Selection				
	Cowboys Moneyline	**49ers Moneyline**	**Cowboys Spread**	**49ers Spread**	**N**
Control Condition	9 (22.50%)	8 (20.00%)	7 (17.50%)	15 (37.50%)	40
Line Movement Condition	7 (17.95%)	6 (15.38%)	19 (48.72%)	8 (20.51%)	39
Promotion Condition	16 (40.00%)	8 (20.00%)	4 (10.00%)	12 (30.00%)	40
N	32	22	30	35	119
χ^2	19.14**				

Note. df = 6. This contingency table demonstrates the frequency distribution of bet selection in the pilot study, and the numbers in the table represent the counts of participants choosing that bet selection in each condition. Highlighted numbers indicate the bet selection that was most picked in each condition. The percentages in the parentheses denote the proportion of bettors who selected a given betting option within each condition. The Cowboys were the underdog in this game. **p < .05

According to the American Gaming Association, 70% of the core sport bettors (who placed a sport bet in the past 12 months) are male and 45% are between 23-34 years old (American Gaming Association, 2019). Statista research (2023) also shows that sports betting application users in the United States tend to skew younger (30 to 44) and highly skew male. In addition, U.S. sport betting demographics skew white (Spotlight Sports Group, 2021). I recruited participants on Prolific and the sample demographic was similar to sport betting demographics in the U.S. However, as majority of the sample were male, I still performed a chi-square test of independence on the sample that only included male participants. The relation between betting odds and bet selection was significant, $\chi 2$ (6, N = 90) = 21.41, p = .001. As seen in Table 2.5, I found the similar pattern as in the full sample.

Table 2.5

Contingency Table of the Pilot Study (Male Sample Only)

	Betting Selection				
	Cowboys Moneyline	**49ers Moneyline**	**Cowboys Spread**	**49ers Spread**	**N**
Control Condition	7 (22.58%)	7 (22.58%)	4 (12.90%)	13 (41.84%)	31
Line Movement Condition	4 (14.29%)	2 (7.14%)	15 (53.57%)	7 (25.00%)	28
Promotion Condition	12 (38.71%)	8 (25.81%)	4 (12.90%)	7 (22.58%)	31
N	23	17	23	27	90
$\chi 2$	21.41**				

Note. df = 6. Highlighted numbers indicate the bet selection that was most picked in each condition. The percentages in the parentheses denote the proportion of bettors who selected a given betting option within each condition. The Cowboys were the underdog in this game. **p < .05

2.4.3 Main Study Results

In the first dataset, results revealed a significant association between betting odds and betting selections. The relation between betting odds and bet selection was significant, χ^2 (6, N = 405) = 73.48, $p < .001$. The betting selections significantly differed across three experimental conditions. As seen in Table 2.6, in the line movement condition, participants were more likely to bet on the Bengals point spread (Bengals +5.5). In the promotion condition, participants were more likely to wager on the Bengals Moneyline, which was boosted by odds boost (Bengals +200). The odds of betting on the Bengals Moneyline in the promotion condition were 85/50 = 1.70. The odds of betting on the Bengals Moneyline in the control condition were 47/86 = 0.55. The odds of betting on the Bengals Moneyline were 3.09 times higher in the promotion condition (+200) than in the control condition (-105). The odds of betting on the Bengals Moneyline in the line movement condition were 35/102 = 0.34. The odds of betting on Bengals Moneyline were 5 times higher in the promotion condition (+200) than in the line movement condition (+200). It is interesting to note that the Bengals lost the game by 3 points. In the control and promotion condition, participants who bet on the Bengals Moneyline or the Bengals spread lost their bets. With the percentages in Table 2.6, we can see that in the promotion condition, only 25.93% of the participants won their bets.

Table 2.6

Contingency Table of the First Dataset (Full Sample)

	Betting Selection				
	Bengals Moneyline	**Chiefs Moneyline**	**Bengals Spread**	**Chiefs Spread**	**N**
Control Condition	47 (35.34%)	36 (27.07%)	30 (22.56%)	20 (15.04%)	133
Line Movement Condition	35 (25.55%)	25 (18.25%)	64 (46.72%)	13 (9.49%)	137
Promotion Condition	85 (62.96%)	12 (8.89%)	15 (11.11%)	23 (17.04%)	135
N	167	73	109	56	405
$\chi 2$	73.48***				

Note. $df = 6$. This contingency table demonstrates the frequency distribution of the bet selection in the first dataset of the main study, and the numbers in the table represent the counts of participants choosing that bet selection in each condition. Highlighted numbers indicate the bet selection that was most picked in each condition. The percentages in the parentheses denote the proportion of bettors who selected a given betting option within each condition. The Bengals were the underdog in this game. ***$p < .001$

Additionally, as seen in Table 2.7, the results revealed that participants in the promotion condition were significantly more willing to place the bet compared to those in the control condition ($p < .001$, $b = 12.53$). Meanwhile, participants in the promotion condition would also wager more money on the game ($p = 0.09$, $b = 6.90$). Interestingly, as seen in Table 2.8, in the promotion condition, participants who chose to bet on the Bengals Moneyline, which was boosted by odds boost (Bengals +200), showed the most willingness to place the bet and would wager the most amount of money on the game compared to those who chose to bet on other betting options.

Table 2.7

Comparison of Willingness to Bet / Betting Units in Three Conditions

	Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*
Line Movement Condition	5.09*	1.63	2.10	0.50
Promotion Condition	12.53***	3.99	6.90*	1.65

Note. The control condition (no promotion) was coded as baseline. Control variables were included in the regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. *p < .10. ***p < .001

Table 2.8

Comparison of Willingness to Bet / Betting Units among Different Betting Selections in the Promotion Condition

	Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*
Chiefs Moneyline	-0.75	-0.11	-13.43	-1.25
Bengals Spread	-26.35***	-4.22	-16.28*	-1.67
Chiefs Spread	-5.69	-1.09	-9.66	-1.18

Note. Bengals Moneyline was coded as baseline. Control variables were included in the regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. *p < .10. ***p < .001

As seen in Table 2.7, compared to participants in the control condition, participants in the line movement also showed a greater willingness to place the bet (p = 0.10, b = 5.09) and would wager slightly more money (p = 0.61, b = 2.10). As seen in Table 2.9, in the line movement condition, participants who chose to bet on different betting options did not show differences in how much money they would wager on the game. Participants who chose to bet on the Chiefs Spread (Chiefs -5.5) showed the least willingness to place the bet, while those who chose to bet on the Bengals Moneyline (Bengals +200) showed the most willingness to place the bet.

Table 2.9

Comparison of Willingness to Bet / Betting Units among Different Betting Selections in the Line Movement Condition

	Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*
Chiefs Moneyline	-7.34	-1.06	-0.26	-0.03
Bengals Spread	-4.49	-0.81	-1.17	-0.17
Chiefs Spread	-26.73**	-3.12	-4.16	-0.39

Note. Bengals Moneyline was coded as baseline. Control variables were included in the regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. ***p* < .05

As seen in Table 2.10, among the participants who chose to bet on the Bengals Moneyline, those in the promotion condition were significantly more willing to place the bet ($p = 0.002$, $b = 12.93$) and would wager significantly more money on the game ($p = 0.04$, $b = 12.88$) than those in the control condition. However, participants who chose to bet on the Bengals Moneyline in the control condition and the line movement condition did not show significant differences in willingness to bet and how much money they would wager on the game.

Table 2.10

Comparison of Willingness to Bet / Betting Units among Participants Who Bet on the Bengals Moneyline

	Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*
Line Movement Condition	7.51	1.43	4.42	0.56
Promotion Condition	12.93**	3.99	12.88**	2.02

Note. The control condition (no promotion) was coded as baseline. Control variables were included in the regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. ***p* < .05

In the second dataset, the results revealed a significant association between betting odds and betting selections. The relation between betting odds and bet selection was significant, χ^2 (6, N = 432) = 34.22, $p < .001$. The betting selections significantly differed across three experimental conditions. The second dataset showed a slightly different pattern compared to the pilot study and the first dataset. As seen in Table 2.11, in the line movement condition, participants were more likely to bet on the Chiefs Moneyline (Chiefs +200) or the Chiefs point spread (Chiefs +5.5). In this condition, most participants bet on the Chiefs Moneyline (Chiefs +200). In the promotion condition, participants were more likely to wager on the Chiefs Moneyline, which was boosted by odds boost (Chiefs +200). The odds of betting on the Chiefs Moneyline in the promotion condition were 85/62 = 1.37. The odds of betting on the Chiefs Moneyline in the line movement condition were 58/85 = 0.68. The odds of betting on Chiefs Moneyline were 2.01 times higher in the promotion condition (+200) than in the line movement condition (+200). The odds of betting on the Chiefs Moneyline in the control condition were 49/94 = 0.53. The odds of betting on the Chiefs Moneyline were 2.58 times higher in the promotion condition (+200) than in the control condition (+105). It is interesting to note that the Chiefs won the game and participants who bet on the Chiefs Moneyline or the Chiefs spread won their bets. With the percentages in Table 2.11, we can see that in the promotion condition, 67.34% participants won their bets. 74.13% participants won their bets in the line movement condition. Less participants (58.4%) won their bets in the control condition.

Table 2.11

Contingency Table of the Second Dataset (Full Sample)

	Betting Selection				
	Chiefs Moneyline	**Eagles Moneyline**	**Chiefs Spread**	**Eagles Spread**	**N**
Control Condition	49 (34.51%)	29 (20.42%)	34 (23.94%)	30 (21.13%)	142
Line Movement Condition	58 (40.56%)	19 (13.29%)	48 (33.57%)	18 (12.59%)	143
Promotion Condition	85 (57.82%)	22 (14.97%)	14 (9.52%)	26 (17.69%)	147
N	192	70	96	74	432
χ^2	34.22***				

Note. df = 6. This contingency table demonstrates the frequency distribution of bet selection in the second dataset of the main study, and the numbers in the table represent the counts of participants choosing that bet selection in each condition. Highlighted numbers indicate the bet selection that was most picked in each condition. The percentages in the parentheses denote the proportion of bettors who selected a given betting option within each condition. The Chiefs were the underdog in this game. ***p < .001

Similarly to the results of the first dataset, as seen in Table 2.12, the results revealed that participants in the promotion condition were significantly more willing to place the bet compared to those in the control condition (p < .001, b = 11.52). Meanwhile, participants in the promotion condition would also wager significantly more money on the game (p = 0.03, b = 8.66). Interestingly, as seen in Table 2.13, in the promotion condition, participants who chose to bet on the Chiefs Moneyline, which was boosted by odds boost (Chiefs +200), would bet the most amount of money on the game compared to those who chose to bet on other betting options. Those who chose to bet on the Chiefs Spread (Chiefs +1.5) would wager the least amount of money.

Table 2.12

Comparison of Willingness to Bet / Betting Units in Three Conditions

	Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*
Line Movement Condition	5.06*	1.73	4.73	1.14
Promotion Condition	11.52***	3.96	8.66**	2.10

Note. The control condition (no promotion) was coded as baseline. Control variables were included in the regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. *p < .10. **p < .05. ***p < .001

Table 2.13

Comparison of Willingness to Bet / Betting Units among Different Betting Selections in the Promotion Condition

	Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*
Eagles Moneyline	-3.78	-0.77	-15.62*	-1.76
Chiefs Spread	6.02	1.01	-22.20**	-2.08
Eagles Spread	-2.03	-0.44	-3.92	-0.47

Note. Chiefs Moneyline was coded as baseline. Control variables were included in the regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. *p < .10. **p < .05

As seen in Table 2.12, compared to those in the control condition, participants in the line movement also showed a greater willingness to place the bet ($p = 0.08$, $b = 5.06$) and would wager slightly more money ($p = 0.25$, $b = 4.73$). As seen in Table 2.14, in the line movement condition, participants who chose to bet on the Eagles Moneyline (Eagles -250) would wager the least amount of money compared to those who chose to bet on other betting options. Participants who chose to bet on the Chiefs Moneyline (Chiefs +200) and the Chiefs Spread (Chiefs +5.5) would wager more money than those who chose to bet on the Eagles Moneyline or Eagles Spread. Participants who chose to bet on the Chiefs Moneyline (Chiefs +200) showed the

greatest willingness to place the bet. Participants who chose to bet on the Eagles Moneyline (Eagles -250) and the Eagles Spread (Eagles -5.5) showed significantly less willingness to place the bet compared to those who chose to bet on the Chiefs Moneyline.

Table 2.14

Comparison of Willingness to Bet / Betting Units among Different Betting Selections in the Line Movement Condition

	Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*
Eagles Moneyline	-32.86***	-5.53	-25.32**	-2.89
Chiefs Spread	-0.93	-0.21	-0.12	0.02
Eagles Spread	-29.68***	-4.90	-14.29*	-1.60

Note. Chiefs Moneyline was coded as baseline. Control variables were included in the regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. *$p < .10$. **$p < .05$. ***$p < .001$

As seen in Table 2.15, among the participants who chose to bet on the Chiefs Moneyline, those in the promotion condition ($p = 0.004$, $b = 11.32$) and the line movement condition ($p = 0.008$, $b = 9.72$) were significantly more willing to place the bet than those in the control condition. Participants who chose to bet on the Chiefs Moneyline in the promotion ($p = 0.01$, $b = 15.81$) and the line movement condition ($p = 0.08$, $b = 11.86$) would also wager significantly more money on the game than those who chose to bet on the Chiefs Moneyline in the control condition. Participants who chose to bet on the Chiefs Moneyline in the promotion condition and the line movement condition did not show significant differences in willingness to bet or how much money they would wager on the game.

Table 2.15

Comparison of Willingness to Bet / Betting Units among Participants Who Bet on the Chiefs Moneyline

	Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*
Line Movement Condition	11.32**	2.88	11.86*	1.74
Promotion Condition	9.72**	2.67	15.81**	2.02

Note. The control condition (no promotion) was coded as baseline. Control variables were included in the regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. *$p < .10$. **$p < .05$

2.5 Discussion

The overall purpose of Study 1 was to examine how sports bettors adjust their choice of bets when betting odds change. In the experiments, participants were asked to bet on actual NFL playoff games, and betting odds were manipulated by simulating line movement and odds boost promotion. Similar patterns were found in three datasets collected in Study 1 by using three different NFL postseason games. The findings provided evidence to suggest betting odds as important heuristics in betting decision making and the significant effect of betting odds on sports bettors' betting choices. The results suggest that sports bettors would utilize betting odds to form their betting decision, and they may be stimulated by the appeal of odds boost promotions or identify opportunities in the betting lines (e.g., Thompson, 2022). For instance, participants in the current study recognized a safe bet opportunity in the changed betting line and tended to place safe bets. In addition, by exploring heuristic decision making in the context of sports betting, this study provides support for the argument that decision making under uncertainty typically involves heuristics, and using heuristics does not necessarily lead to irrational decisions (Gigerenzer & Gaissmaier, 2011).

In the experiment, participants were asked to place a Moneyline wager or a spread wager, which are two common types of bets in sport betting. The results suggest that participants adjusted their Moneyline and spread wagers on the NFL games when the betting lines moved or when odds boost was added, even when the uncertain nature of the games did not change. Under the changes of betting odds, participants would adjust their wagers for a betting option that had a greater chance of winning or an option with higher profits. This study adds to the sport betting literature by using real games to create betting tasks and employing two common bets in the experiments to test and confirm the influential and informative role of betting odds in betting decision making. Through investigating the effect of betting odds on Moneyline wagers and spread wagers, this study also sheds light on how betting odds may be scrutinized to identify betting opportunities.

In the control condition, it appeared that there was no betting selection that participants were significantly more prone to bet on. In the pilot study, more participants (37.50%) chose to bet on the spread of the favorite. In the two datasets of the main study, more participants (35.33% in the first dataset; 34.51% in the second dataset) chose to bet on the underdog's Moneyline. The point spread of a game represents the margin by which the favored team is anticipated to win (Camerer, 1989), and the two games in the main study had a spread of 1 and 1.5, respectively. The game in the pilot study had a spread of 3.5. According to the betting lines, the games used in the main study may involve greater uncertainty than the divisional game used in the pilot study. When the game was closer to even, some sport bettors may be prone to think that the underdog had a good chance to win while betting on the underdog provided a higher profit.

In the line movement condition, participants were more likely to bet on the underdog's spread. In the pilot study, 48.72% of the participants chose to bet on the underdog's spread (Cowboys +8.5). In the first dataset of the main study, 46.72% of the participants chose to bet on the underdog's spread (Bengals +5.5). However, in the second dataset of the main study, participants were prone to bet on both the underdog's spread (Chiefs +5.5; 33.57%) and the underdog's Moneyline (Chiefs +200; 40.56%). In sum, betting on the same NFL games, participants' shifted their choice of bets when betting odds and lines were changed. The most interesting pattern in the line movement condition was that participants were more likely to bet on the underdog's spread, which may be identified as a safe bet and an opportunity to win.

The participants recruited in the study have bet on NFL games and have consumed NFL content. Although the betting odds were manipulated in the line movement condition, participants were able to understand that the NFL games in the experiments were close postseason games and may also realize that the Moneyline and spread odds they saw did not truly represent the winning probabilities of the game. Since participants were paid according to the betting odds, they may start scrutinizing the changed betting line and choose the betting selection that had a better opportunity to win. In the line movement condition, betting on the underdog spread was a safer bet, as the underdog could lose more points and the participants still won their bets. For example, in the first game of the main study, if participants bet on the Bengals' spread (+1) in the control condition, the Bengals had to win the game so that participants won their bets. However, in the line movement condition, if participants bet on the Bengals' spread (+5.5), with the same betting odds and payouts, the Bengals only needed to lose by less than 6 points. Although this betting selection did not provide higher winnings, it had a greater chance of winning compared to other betting selections. Interestingly, in the dataset that

used the Super Bowl game, participants were more likely to bet on the underdog's Moneyline as well. It could be because the Super Bowl game was close to even and the underdog had a high chance of winning the game. The participants may identify betting on the underdog's Moneyline as another opportunity to increase winnings. The betting trends in the line movement showed that observing the betting odds could help sport bettors identify opportunities to win, and using heuristics to make decisions could be frugal and effective (Gigerenzer & Gaissmaier, 2011).

In the promotion condition, the results were consistent with previous studies (e.g., Browne et al., 2019; Newall et al., 2019; Rockloff et al., 2019) that participants were stimulated by the odds boost promotion and were more likely to bet on the underdog's Moneyline, which provided higher potential payouts. In the pilot study, 40% of the participants chose to bet on the underdog's Moneyline with boosted odds. In the main study, the numbers jumped to 62.96% and 57.82%. The games used in the study were NFL postseason matchups, where both teams had high probabilities of winning and the results could be hard to predict. The odds boost promotion offered a higher payout opportunity for bets on the underdog, who had a good chance of winning. Thus, the promotion appeared to be a heuristic cue influencing sport bettors' decision making under high uncertainty, suggesting a compelling rationale for betting on the underdog's Moneyline. In addition, the underdog won the Super Bowl, and betting on the underdog with promotional odds and using heuristics does not necessarily lead to losing (Gigerenzer & Gaissmaier, 2011). Furthermore, the findings showed that if the game involves greater uncertainty, the odds boost promotion can be more effective in prompting participants to bet on longer odds.

It is important to note that the Moneyline odds for the underdog remained consistent in both the line movement and promotion conditions. In the promotion condition, the Moneyline

odds for the underdog was increased by adding an odds boost promotion. In the line movement condition, the Moneyline odds for the underdog was increased to match the boosted odds in the promotion condition without the provision of an odds boost, and the betting line of the game was shifted accordingly. Betting odds increased with the appeal of odds boost significantly led to more wagers on the boosted odds for higher payouts. Increased odds and profits were attractive to sport bettors under the heuristic cues of odds-related incentives. When the betting line moved, despite offering the same increased odds, a safer betting option (i.e., increased underdog spread with the same betting odds) existing in line movement was identified and attracted wagers. In a betting line, a safe bet could be more appealing than riskier bets with potentially higher payouts. The results suggest that participating in a risky activity, sport bettors may be drawn to the safer option if it is available.

Concerning betting units on the games and willingness to place the bet, odds boost promotion not only induced participants to bet on the longer odds, but also increased willingness to place the bet and the amount of money spent on the bet. Sports bettors may not be willing to wager on the game and risk too much money under high uncertainty, but odds boost promotion acted as an important inducement to invoke people to bet and increase wagers. The results of Study 1 revealed a significant effect of gambling promotion offers on sports bettors' choice of bets, wager amount on the bet, and willingness to place the bet. The effect of promotional offers will be further investigated and discussed in Study 2 and Study 3. The findings also revealed a higher willingness to bet in the line movement condition. It could be because participants identified the winning opportunities in the betting lines, which made them more willing to bet on the game.

2.5.1 Theoretical Significance

The results of Study 1 support the important role of betting odds argued in the sport betting literature and provide insight on how betting odds alter the choices of Moneyline and point spread bets with real NFL games and experimental design. Although betting odds could be unreliable information in decision making (e.g., Paul & Weinbach, 2005; Wheatcroft, 2020), findings of this study suggest that sport bettors inevitably utilize betting odds to inform their decision making, including choices of bets and wager amounts. Betting odds not only determine final payouts and implied probabilities but also provide crucial information that helps bettors identify winning opportunities. The results fell in line with findings from previous research (e.g., Boniface et al., 2012; Francisco & Moore, 2019; Killick & Griffiths, 2021; Krieger et al., 2021; Mani, 2018; Tak et al., 2018). Sport bettors are looking for profitable betting strategies (e.g., Ryan et al., 2012), and they would observe betting odds and shift in the spread to secure positive returns and identify winning opportunities in the betting market. To find better odds, sport bettors can shop around different sportsbooks for odds boost promotions or to compare the betting lines set by different operators (e.g., Tak et al., 2018). In addition, when sport bettors participate in in-play betting, the betting odds and spread change as the game takes place in real time, and sport bettors can observe and take advantage of the shift in the betting line and place bets. This could be one of the reasons why in-play betting is one of the most popular forms of sports betting (Gainsbury et al., 2020).

Furthermore, this study adds to the previous sport betting literature that when sport bettors are able to identify betting opportunities, they are prone to take the opportunities, wager more money, and show more willingness to participate in betting, even though the opportunities do not guarantee winnings. Therefore, sportsbooks are willing to offer inefficient odds (i.e., better odds for sport bettors to win more money) and odds-related promotions to attract and

retain customers and maximize long-term profit (Kuypers, 2000). Regarding the effect of odds boost promotions, the experiments in this study intentionally boosted the odds of the underdog in the matchup and examined whether the promotion induced sport bettors to bet on the underdog. The findings are aligned with previous research on gambling marketing that gambling promotions induce sport bettors to select longer odds (e.g., Browne et al., 2019; Rockloff et al., 2019). Providing higher winnings is an effective marketing technique in sport betting, and it will be further investigated with another popular promotion, risk-free bets, in Study 2 and Study 3.

In addition, in previous studies, gambling promotions are usually considered as "traps", which could result in more risk-taking and losses (e.g., Rockloff et al., 2019). It is interesting that in the experiment using the Super Bowl game, participants who bet on the underdog with boosted odds won their bets with higher winnings. The result suggests that under high uncertainty, betting on the underdog with boosted odds is not necessarily riskier but rather presents an opportunity to obtain higher winnings. While sportsbooks are utilizing different marketing techniques to lure customers, customers, in turn, can leverage gambling promotions to identify betting opportunities and maximize their profits (Nyemcsok et al., 2022).

Study 1 draws on heuristic decision making and views betting odds as important heuristics when sports bettors place a bet on sporting events. On the one hand, betting odds as heuristics can assist sports bettors in forming decisions under uncertainty, but reliance on heuristics could lead to biases (Armstrong et al., 2020; Tversky & Kahneman, 1974). In sport betting, biases mean a systematic error and distortion in thinking, affecting how sport bettors make decisions and developing a disproportionate weight in favor or against choice options. In the promotion condition, participants were prone to bet on the underdog. The odds of betting on the underdog Moneyline were about three times higher in the promotion condition than in the

control condition. On the other hand, using betting odds to form betting decisions can be efficient in sport betting. For instance, participants tended to identify and choose the betting option that had a greater chance of winning in the line movement condition. In sport betting, an irrational decision is a choice that deviates from logical reasoning and objective analysis of relevant information and probabilities. The findings suggest using heuristics does not necessarily mean little thought or lead to irrational decisions (Kahneman & Varey, 1991), and heuristic decision making can be efficient (Gigerenzer & Gaissmaier, 2011).

By investigating heuristic decision making in the context of sport betting, this study resonates with what Gigerenzer and Gaissmaier (2011) argued in their research. Decision making under uncertainty typically involves heuristics, and using heuristics is not necessarily good or bad, rational or irrational. Decision makers should select proper heuristics to form decisions and can combine heuristics and logical arguments in the decision-making process (Griffin & Tversky, 1992). This study also adds to the previous gambling literature that explores heuristic-based strategies. Some previous studies criticized the use of heuristics in gambling (e.g., D'Astous & Gaspero, 2013; Killick & Griffiths, 2022b; Kirkpatrick & Epstein, 1992; Walker et al., 2019), which could lead to biases, errors, and risky behavior. D'Astous and Gaspero (2013) considered using betting odds as heuristic processing to reach easy and quick decisions and concluded that heuristic processing deteriorates gambling performance. The authors also suggested that analytical thinking (i.e., analysis of relevant information) can improve winnings. However, the current study suggests that scrutinizing betting odds can have a positive impact on betting decision making and help identify potential betting opportunities. Using betting odds is unavoidable in betting decision making and could facilitate winning strategies (e.g., Krieger et al., 2021; Mani, 2018). In summary, there are positive and negative aspects of heuristic decision

making in the uncertain world. It is important to properly recognize and utilize heuristics rather than dismissing heuristics as inherently biased and irrational.

2.5.2 Practical Implications

Study 1 offers several noteworthy insights for sportsbook operators and marketers. First, sport bettors would utilize the information they have (e.g., betting odds) and identify winning opportunities when they place bets. Although sportsbooks manipulate betting odds to exploit bettor bias in the market to earn higher profits (e.g., Humphreys, 2010), it is possible that sport bettors are at the same time learning to be smart with utilizing betting odds and tracking line movement. Typically, to bet on sports, bettors analyze relevant information and predict the outcome of the game. Today, sport bettors can search articles online about betting strategies and how to analyze line movement to make profits (e.g., Clark, 2021). Sport bettors would also shop around different sportsbooks for better odds that provide higher winnings (e.g., Boniface et al., 2012). In addition, comparing the choice of bets in the line movement condition and the promotional condition, the current study found that safe betting options (i.e., bets that are easy to win) are also appealing to customers, even though safe bets do not offer high payouts. Sportsbooks should be aware that with available information and the ease of accessing different sportsbook platforms, sport bettors are learning to be strategic in their betting approach and identify opportunities to increase their chances of winning and maximize profits.

From a marketing point of view, betting odds have become an important part of sportsbook products to attract customers and wagers. While sportsbook operators provide a platform for people to wager on sports, they are also "selling" betting odds to their customers. To compete with other sportsbook operators, offering inefficient odds (i.e., better odds or safer bets for customers) and odds-related promotions are efficient strategies to retain customers and

increase engagement. Meanwhile, although legal sport betting is growing rapidly in the U.S., some people are reluctant to participate in sport betting due to the risk of losing money (Jackson et al., 2023). The current study found that when winning opportunities existed in the betting lines or when promotional offers were provided, sport bettors were more likely to participate in sport betting, take the opportunities, and wager more money. Thus, to attract new customers, offering safe bets, low-risk betting promotions, or exciting incentives such as higher winnings could be a good strategy to increase their willingness to participate in sport betting.

The findings also inform gambling regulation authority of the effect of odds-related promotions. Boosting the betting odds of the underdog in a game that involves high uncertainty appears to be very effective in attracting sport bettors to bet on the underdog. In the current study, the odds of betting on the underdog Moneyline were approximately three times higher when odds boost promotions were available compared to when there was no promotion. Meanwhile, when odds boost promotions were offered, individuals were more willing to bet and would wager more money. It is important to pay attention to the potential harm of odds-related promotions. As legal sport betting rapidly expands in the U.S., gambling regulation authority should closely monitor the marketing tactics employed by sportsbooks and assess the impact of these marketing strategies.

2.6 Limitations and Future Studies

Although this study shed additional light on the effect of betting odds on sport bettors' decision making, there are some limitations. First, the measure of betting units ('Please indicate the maximum units you are willing to wager: 100 units = the amount of money that you usually bet on a single sport betting session'; 0 – 100) cannot capture whether participants were willing to wager more money on the game than what they usually bet. The maximum units willing to bet

was capped at 100 units, and the effect of betting odds on betting units might be more pronounced if participants were able to report they wanted to bet more than usual. The results of the current study still provided some valuable insights. For example, the average of betting units was 53.56 (*SD* = 35.07), and participants would wager significantly more money if odds boost promotion was provided. Study 2 and Study 3 improved the measure of betting units on the game by allowing participants to report higher betting amount than what they usually bet to provide more accurate insights.

Another limitation of this study is that sample repetition may exist across the three experiments and learning effect might impact the results. Some participants may have taken part in two or all of the experiments (including pilot study) in Study 1, and the consistent and reproducible betting odds effect across the three NFL games might be partly due to the repetitive sample. To prevent sample repetition and learning effect, in Study 2 and Study 3, I used a prescreening survey to recruit participants first and then invited qualified participants to the main studies. Those who participated in Study 2 were not be able to participate in Study 3. In addition, participants in Study 1 were familiar with sport betting and the NFL. They have previously bet on the NFL games and have consumed NFL content. Therefore, the results may be confined to NFL sport bettors and may not reflect betting decision making among non-bettors or new sport bettors who are not familiar with sport betting or the NFL.

The study only had three conditions in each experiment, and I manipulated the betting odds through two scenarios: line movement and adding odd boost promotions. Although I found that sport bettors changed their choice of bets when the betting line shifted, the results may not provide in-depth analysis on how sport bettors' decisions change according to how the betting line moves. Future research can focus on the effect of line movement and add a smaller margin

of odds change in each experimental condition to investigate the relationship between line movement and betting decision making. Another drawback of this study could stem from no real payouts and hypothetical gambling scenarios. Participants did not risk their own money or receive payouts during the betting process, and the results may not accurately reflect how sport bettors would bet on the game. For example, participants may be less likely to bet on the underdog Moneyline if they risk their own money. Future research can create a more real gambling situation by providing winnings in the experiments or utilizing other methodologies such as observation to track sport bettors' decision making.

Furthermore, this study only used playoff games with high outcome uncertainties in the experiments. The results could be different if the experiments use low-uncertainty games such as a game that has a strong favorite. The effect of odds-related promotions could also be less pronounced when the game involves low uncertainty. Therefore, future studies can include games that involve different levels of uncertainty to provide more insights on the effect of betting odds.

Chapter 3 Promotional Offers, Sports Bettor Characteristics, and Decision Making in Sport Betting (Study 2)

3.1 Introduction

Study 1 identified the effect of odds boost as a form of promotion on sport bettors' decision making. As promotional offers are one of the most important marketing strategies for sportsbooks to attract customers and influence bettors' decision making (e.g., Rockloff et al., 2019), Study 2 further investigates the effects of two types of promotion most commonly adopted in sport betting: profit boost tokens and risk-free bets (Ammirante, n.d.; Tussey, 2023). These two types of promotional offer are also frequently discussed in sport betting behavior research and are shown to be common and influential inducements (e.g., Hing et al., 2016b; Hing et al., 2019b; Houghton et al., 2019; Killick & Griffiths, 2022a; Rawat et al., 2020). A profit boost token increases the actual profit sport bettors will make if they win their bets (DraftKings, n.d.). For example, if a customer bets $10 at +200 odds and applies a 50% profit boost token to the bet, the potential payouts will increase from $30 to $40. On the other hand, a risk-free bet is an offer in which sport bettors' wager will be refunded to them if their risk-free bet is settled as a loss. Customers will receive a refund in various ways, such as a free bet, site credit, or cash back, depending on the sportsbooks and their terms and conditions for the promotion (Janvrin & Pempus, 2023).

Although previous research has investigated the effect of gambling promotional offers on betting behavior and problem gambling (e.g., Hing et al., 2019b), only a few studies explored how sport bettors place wagers on sporting events when promotional offers are provided, and

little is known about the differences between these promotions. Even though both profit boost tokens and risk-free bets offer financial incentives to place a bet, they could influence betting decisions differently. Profit boosts emphasize higher payout (reward) if the bet is successful. With profit boost tokens, bettors have higher potential payouts, but bettors will lose money if the bet is unsuccessful. In contrast, risk-free bets frame risky betting decisions as no risk. With risk-free bets, bettors do not have higher potential payouts, but bettors will gain a second chance to bet or simply get their money back if they lose the bet (Janvrin & Pempus, 2023). However, the language, "no risk" in this promotional offer can be false and misleading. Bettors typically get their wager back in site credit or free bets, and risk-free bets require bettors to risk their own money and can still result in losing money (Funt, 2022). Recently, the American Gambling Association updated its Responsible Marketing Code to prohibit the "risk free" language in promotions (Greenberg, 2023). Sportsbooks such as DraftKings changed the name of risk-free bets to "No Sweat" bets (Funt, 2022) attempting to circumvent the marketing code yet downplaying the potential risk associated with betting.

Therefore, Study 2 employs two prominent promotional offers (i.e., profit boost and risk-free bet) to investigate if these offers influence betting decisions and whether they show differences in increasing bettors' risk-taking levels when bettors place a bet. The betting decisions measured in this study include the choice of alternative spread on a basketball game, the willingness to place the bet, and the betting units if participants bet with their own money. I used these three measures to represent sport bettors' risk-taking level when they place a bet. This is based on the notion that wagering on an uncertain outcome itself is a risk-taking behavior and thus individuals' willingness to bet, selecting riskier choices (alternative spread), or wagering higher number of units all constitute (financial) risk-taking behaviors. Furthermore, I proposed

that bettor characteristics could affect how customers respond to promotional messages (Armstrong et al., 2020). While promotional offers significantly increase riskier bet selections (Rockloff et al., 2019), people with lower levels of risk-taking tendency may be less influenced by higher winnings and stay less risky. No-risk framing could be more effective for lower risk takers, who tend to avoid risks. At the same time, bettors with more experience could be more strategic with gambling promotions and critically reflect on the risks associated with promotional offers (Nyemcsok et al., 2022). Experienced sport bettors may be less influenced by promotional offers to avoid traps in gambling marketing schemes. Therefore, Study 2 examines if risk-taking tendency and betting experience influence the effect of profit boost tokens or risk-free bets on betting decisions. In the conceptual model (Figure 1.2), promotional offers were the independent variable and sport bettor characteristics were proposed as the moderating variables. Betting decisions were proposed as the outcome variables. Study 2 used a National Basketball Association (NBA) regular season game and provided winnings to create a real gambling scenario.

In addition, this study uses the framing effect described by prospect theory (Kahneman & Tversky, 1984; Tversky & Kahneman, 1981; Tversky & Kahneman, 1992) and views promotional offers as marketing messages that frame betting decision problems and gambling consequences differently. A betting decision problem and its potential outcome in different frames will affect decision makers' perception of risk and willingness to take risk (Kahneman & Tversky, 1984; Levin et al., 1998). The sport betting promotional offers tested in the study are unique compared to other forms of gambling, and these offers frame sport betting decision problems by changing betting consequences to higher winnings or getting cash back. Using framing effect as the theoretical framework, the findings advance our understanding of gambling

promotional offers that serve as one of the marketing frames to change betting behavior. Moreover, individual differences were ignored in prospect theory, and Study 2 explores the interaction effect of individual differences and marketing framings on risk-taking in sport betting. By investigating sport bettor characteristics, this study highlights the role of individual differences in framing effect and shows how different groups of sport bettors react to gambling marketing framings. The effectiveness of framing effect in sport betting may depend on the levels of risk-taking tendency and betting experience in sport bettors.

Study 2 contributes to sport betting research by comparing the effectiveness of two types of gambling promotional offers, risk-free bets and profit boost tokens, on betting decisions and risk taking levels when sport bettors place a bet. Moreover, this study adds to sport marketing literature by examining how sport bettors with varying betting experience and risk-taking tendency may react to sport betting marketing strategies and suggesting the importance of customer characteristics in marketing framings. By testing two promotional offers in an experimental design, sportsbook operators can reflect on the effectiveness of current promotions and understand the role of sports bettor characteristics in betting with promotions. Meanwhile, the findings inform future strategic promotion planning processes. One important strategy is to develop customized promotions to target different customers based on their betting behavior and personal traits. For example, profit boost tokens may work more effective toward new sport bettors than long-time sport bettors. Sportsbook can monitor and utilize data such as betting frequency, betting length, and previous betting choices to identify users' betting experience and their tendency to take risks to plan customized promotional offers accordingly. On the other hand, it is important for legislators and the sport betting industry to prevent misleading or aggressive marketing that can target vulnerable consumer segments. The findings offered

empirical evidence that certain characteristics of bettors can prompt consumers to become more susceptible to gambling promotion and problem gambling.

3.2 Literature Review

3.2.1 Risk-free Bets and Profit Boost Tokens

Sport betting promotions are a tempting element in the decision-making process that drives gambling consumption and betting decisions (Hing et al., 2015a). Sport bettors commonly perceive advertisements about bonuses as positive and attractive (Lamont et al., 2016). In a betting promotion study, customers described that promotional offers were one of the most effective marketing strategies in inducing themselves to bet on sports (Deans et al., 2017). To date, previous studies have focused on the relationship between promotional offers and betting behavior such as betting impulsivity, betting expenditure, betting frequency, and problem gambling (e.g., Deans et al., 2016; Hing et al., 2019b; Killick & Griffiths, 2022b). Researchers suggest that more research is needed to understand how different types of gambling promotions influence betting consumption (Hing et al., 2015a) and risky types of bets (Hing et al., 2017a). The current study focuses on two most prevalent types of promotional offer in the U.S. sport betting context: profit boost tokens and risk-free bets, and investigates the effect of these two promotions on wagers on sporting events.

Risk-free bets provide sport bettors with credit or cash back when their bets result in a loss, portraying sport betting as a no-risk activity. Risk-free bets give people the impression that sport betting is a harmless activity to engage in (David et al., 2019). Previous research found that risk-free bets are the most persuasive and enticing advertisement in converting attention into betting intention (Hing et al., 2017b). In addition to increasing betting inclination, inducements that promote reduced risk are particularly influential in driving up betting expenditure (Browne

et al., 2019). One study found that sport bettors reported cashback offers, one of the reduced risk offers, as the most influential offers that affect their betting decisions (Hing et al., 2019b). Although risk-free bets offer incentives to sport bettors in the event of losing their bets, the no-risk framing is likely to contribute to erroneous cognitions (Hing et al., 2017a; Lopez-Gonzalez et al., 2017a), increase betting engagement, and promote less planned gambling behaviors (Lopez-Gonzalez & Griffiths, 2017).

Another commonly used promotional offer, profit boost tokens provide sport bettors with increased profits when their bets result in a win. The better-winning offers are among the most popular and influential promotions (Hing et al., 2019b). One study found that participants ranked better odds and winnings as the most attractive offers compared to other incentives such as bonus bet, reduced-risk bet, and cashback offers (Rockloff et al., 2019). Risk-free bets and profit boost tokens both provide sport bettors with financial incentives. However, risk-free bets are designed to mitigate losses, while profit boost tokens are intended to enhance winnings. These two offers may impact betting behavior and decisions in various ways. Previous research suggests that risk-reduced offers attract more attention than better odds and other offers (Lole et al., 2020). Among different types of promotional offers, better odds and winnings appear to lead to less risky bets, while bettors tend to place the riskiest bets when cashback offers are available (Rockloff et al., 2019). In contrast, Hing et al. (2019b) discovered that nearly all types of promotional offer prompted riskier bets, with the exception of cashback offers. Also, sport bettors were more likely to place safer bets when they received bonus bets. Therefore, risk free bets and profit boost tokens can result in different betting decisions and risk-taking levels.

Although previous studies have started examining various types of gambling promotions, limited research has provided a real betting scenario and investigated how these two commonly

employed promotional offers influence sport bettors' choice of bets when wagering on sporting events. For example, will profit boost tokens or risk-free bets significantly prompt sport bettors to choose longer odds and wager more money? In addition, the effectiveness of risk-free bets and profit boost tokens and their differences are not well understood, and empirical findings have been inconsistent. A further examination is needed to understand how risk-reduced and higher-profit promotions function in sport bettors' decision-making process. Compared to risk-free bets, profit boost tokens provide bettors with only one chance to pursue higher payouts. To achieve a higher gain with one opportunity, bettors may be more careful and take less risk than when they have a second chance or money back. In contrast, under the condition of "no risk" when participating in risky betting activities, sport bettors may seize the opportunity to be more risk seeking for small probabilities of higher payouts (Janvrin & Pempus, 2023). Therefore, Study 2 tested the following two hypotheses:

H1: Promotional offers increase sport bettors' risk-taking levels when they place a bet.

H2: Compared to profit boost tokens, risk-free bets increase more risk-taking levels when sport bettors place a bet.

3.2.2 Responses to Betting Promotional Offers and Sport Bettor Characteristics

A growing literature has explored how promotional offers affect sport bettors' feelings and perceptions during decision making. Previous studies found that promotional offers decrease feelings of risk, create perceptions of greater control, and make sports bettors feel that they are more likely to win (Browne et al., 2019; David et al., 2019; Deans et al., 2016; Deans et al., 2017; Killick & Griffiths, 2022b). One participant in Killick and Griffiths (2022b) study said, "*You just think that you're going to win more because the odds are better. It almost feels like it's a guarantee but it's not* (Killick & Griffiths, 2022b, p.806)." Another study found that

participants believed they could take advantage of promotional offers at different sportsbooks but rarely considered the risks associated with their gambling and promotional offers (Deans et al., 2016). Sport bettors think they could maximize their winnings through taking advantage of promotional offers and rationalize their decisions to utilize these offers as good opportunities (Deans et al., 2017). Current techniques of promotional offers are likely to mislead consumers to overestimate the attractiveness of the offers and underestimate their true cost (Hing et al., 2019a). Consequently, promotions invoke urge and impulsiveness to bet, nudge sport bettors to open multiple betting accounts and engage in more betting, and increase betting expenditure (e.g., Deans et al., 2016; Hing et al., 2014a; Hing et al., 2014c; Hing et al., 2018a; Hing et al., 2019a; Hing et al., 2019b). To enhance customer protection, detailing key terms and conditions for an offer can lower perceived attractiveness of the offer (Hing et al., 2019a).

In addition to feelings and perceptions, sport betting promotions can have a significant impact on sport bettors' decisions. Research has shown that gambling promotional offers are linked to risky and irrational betting decisions, incentivizing customers to engage more in sport betting, place larger bets, and choose longer odds, as these are perceived to be attractive wagers (Hing et al., 2017a; Hing et al., 2018b; Hing et al., 2019b; Killick & Griffiths, 2022b; Rockloff et al., 2019). Rockloff et al. (2019) suggest that longer odds with incentives actually result in more bettors in a losing position and fewer bettors achieving larger wins. Risk-free bets can also increase losses by encouraging higher betting expenditure (Browne et al., 2019). Although some individuals understand that promotional offers are a marketing tactic and "hooks" that make sport betting harmful and addictive, promotional offers still influence their decisions to place bets and how much they wager on the game (Deans et al., 2017; Lopez-Gonzalez et al., 2020a).

Previous research suggests that individuals interpret and respond to gambling promotions differently (Lamont et al., 2016; Thomas et al., 2012). Lamont et al. (2016) developed a conceptual model examining the interplay between gambling promotion message delivery and sport viewers' responses to gambling promotion, and proposed demographics of sport viewers as an important moderator. Thomas et al. (2012) found that people from low-economic backgrounds and moderate and high-risk bettors were particularly influenced by gambling marketing strategies. Hing et al. (2015a) suggest that problem gamblers have the highest approval for gambling promotions and are more vulnerable to sport bets with promotional appeals such as good odds available. In contrast, Killick and Griffiths (2020) and Rockloff et al. (2019) found that inducements were attractive to all bettors and the problem gambling status did not influence the type of bet wagered in responses to wagering inducements. Personalized marketing techniques are one of the main marketing paths, and bettors receive customized communications and promotions from sportsbooks (Lopez-Gonzalez et al., 2020a). Further research is needed to understand how risk-reduced and higher-profit promotions increase risk-taking behavior in sport betting when targeting different customers. Risk-taking tendency and betting experience are two important personal characteristics in sport betting, but little is known about how these traits change reactions to betting promotions. For example, profit boost tokens can increase bettors' risk-taking levels, but how do this promotion affect low-risk takers or experienced sport bettors? It is expected that high-risk takers would take greater risk in profit boost promotions while low-risk takers might take less risk in the same promotion conditions. It is also plausible that promotional offers might influence novice bettors more than the experienced bettors in increasing their risk-taking levels. Therefore, Study 2 examines how sport

bettors with different levels of risk-taking tendency and betting experience react when they are provided with risk-free bets or profit boost tokens to place a bet.

3.2.2.1 Risk-Taking Tendency

Risk-taking tendency is a decision maker's tendency to take or avoid risk and captures individual differences in the general orientation toward risk-taking behaviors (Sitkin & Weingart, 1995; Wong, 2005; Zuckerman & Kuhlman, 2000). The tendency to take risk is strongly rooted in personality (Nicholson et al., 2005), and it would impact people's attitude in most social risk domains (Bakalova & Panchelieva, 2023), risk choices (Meertens & Lion, 2011) and risk-taking behavior (Nicholson et al., 2005; Wong, 2005). For instance, high-risk takers view risks as more appealing and less risky (Knowles, 1976; Sitkin & Weingart, 1995). Risk-taking tendency influences the decision-making process, and it is an important factor in heuristic-based decision-making models (Furman et al., 2010). Although framings impact the attitude to risk and gambling promotional offers lead to riskier betting decisions, individuals differ in their tolerance for risk and risk-taking behavior (Bromiley & Curley, 1992; Kowert & Hermann, 1997). People with higher levels of risk-taking tendency may react more positively to gambling promotions and take more risks when placing a bet. In contrast, people who tend to avoid risk may not make riskier betting decisions even when they have profit boost tokens.

Risk-taking tendency has been shown to significantly impact responses to messages, advertisements, and subsequent behavior (e.g., Dharshing & Hille, 2017). A study found that low-risk individuals expressed lower perceptions of trust and greater perceptions of risk to rational advertisement of health care than high-risk individuals (Kemp et al., 2015). In addition, risk-taking tendency is a predictor of preference for gambling risks and gambling behavior (Situ & Mo, 2016; Zaleskiewicz, 2001). Risk-taking tendency is positively related to gambling

involvement, high-risk gambling, and problem gambling (Mishra et al., 2017; Zuckerman & Kuhlman, 2000). Situ and Mo (2016) suggest that risk-taking tendency increases the severity of gambling behavior through enhancing gambling-related irrational beliefs. Moreover, gambling is an emotionally involving activity (Bran & Vaidis, 2019), and sensation seeking is a key component of risk-taking tendency (Nicholson et al., 2005). Therefore, people with a higher risk-taking tendency may exhibit more attention and positive responses to gambling promotions and engage in riskier betting behavior, place riskier bets, and increase the number of trades (Markiewicz & Weber, 2013) than those with a lower risk-taking tendency.

Previous research suggests that risk-taking tendency is a moderator of framing effect (Gang, 2014; Kemp et al., 2015; Mahoney et al., 2011). For instance, Kemp et al. (2015) found that emotional advertisement is more effective than rational advertisement in fostering trust and mitigating risk perceptions in low-risk individuals. Gang (2014) found that in the positive frame condition, people with a lower risk-taking tendency preferred to avoid risks, and people with a higher risk-taking tendency preferred the riskier option. Profit boost tokens positively frame the betting decision problem and emphasize one chance of financial gains, and thus bettors with a lower risk-taking tendency may be less likely to place riskier bets than those with a higher risk-taking tendency. In addition, bettors with a high risk-taking tendency are usually sensation seekers and goal achievers (Nicholson et al., 2005), and they may be more likely to be influenced by the higher winning opportunities and take risk. Therefore, when using profit boost tokens to place a bet, individuals with a higher risk-taking tendency may be more risk seeking than those with a lower risk-taking tendency.

Risk avoiders are more sensitive to risk than risk takers (Sitkin & Weingart, 1995), and their perceptions of risk are more likely to be influenced by marketing messages that can

mitigate risk perceptions (Kemp et al., 2015). Risk-free bets use the "no risk" framing to reduce risk perceptions in sport betting. Meanwhile, risk-free bets do not provide higher profits for bettors to achieve. Since risk takers are already more likely to perceive risky situations as low risk (Sitkin & Weingart, 1995) and more likely to achieve higher-level goals (Nicholson et al., 2005), the "no risk" framing may not significantly lower their risk attitudes and may be less influential on their betting decisions. In contrast, risk avoiders have a high sensitivity to risk (Sitkin & Weingart, 1995), and the "no risk" framing could significantly affect and lower their risk perceptions when they place a bet. Subsequently, risk avoiders may place risker bets and chase higher payouts that they may not have done when there are no risk-free bets. Therefore, risk-free bets and the "no risk" framing can be more effective in mitigating risk perceptions and encouraging risky behavior among sport bettors with a lower risk-taking tendency. Sport bettors with a lower risk-taking tendency may be more risk-taking with the presence of risk-free bets and reach risky decision similar to higher-risk takers. Therefore, Study 2 tested the following hypotheses:

H3: Promotional offers will have an interaction effect with individuals' risk-taking tendency.

H3a: When sport bettors receive profit boost tokens, sport bettors with a higher risk-taking tendency will exhibit higher risk-taking than those with a lower risk-taking tendency.

H3b: When sport bettors receive risk-free bets, there will be no significant differences in risk-taking levels when placing a bet between low- and high- risk takers.

3.2.2.2 Betting Experience

Sport betting is often argued to be a form of gambling that requires skill (Binde et al., 2017; Buchdahl, 2003; Khazaal et al., 2012). Sport betting might allow participants who have

knowledge about sport, analytical skills, and betting experience to influence the results of gambling and increase the probability of winning (Andersson et al., 2005; Brown & Reade, 2019). Research suggests that betting experience can positively affect betting performance in skills-based betting contexts such as sport betting (e.g., Forrest & Simmons, 2000). Sport betting experience increases the use of analytical processing, which improves gambling performance (D'Astous & Gaspero, 2015). In addition, previous studies found that sport experts' predictions of a sporting event were more accurate than those of a random model (Cantinotti et al., 2004; Forrest & Simmons, 2000). Sporting knowledge plays a key role in the accuracy of sport game prediction (Na et al., 2018). Experts take more time to determine the value, are more selective in using available information, and are better at screening information (Spence & Brucks, 1997; Dillon et al., 2001). In risky financial decision making, experts are also better at evaluating risk than novices, and improved expertise enables consumers to make better financial decisions (Byrne, 2005). Hence, knowledge and experience can positively contribute to financial decisions and success.

However, sport involves uncertainty and unpredictability (Forrest & Simmons, 2002), and skill cannot guarantee any certainty of winning. Some scholars argue that sport betting is still a game of chance, and expertise in sport betting seems to be simply an illusion of control and cognitive distortions (Cantinotti et al., 2004; Khazaal et al., 2012). Sport bettors differ in preconceptions about the balance between knowledge and chance in sport betting, which influence their predictions (Lopez-Gonzalez et al., 2020b). Although sporting knowledge and betting experience can increase prediction accuracy (Na et al., 2018), betting success, and financial rewards, they can also increase positive attitudes toward sport betting (Ayandele et al., 2020), reduce beliefs and perceptions about risk (Creyer et al., 2003; Nyemcsok et al., 2022), and

increase winning confidence and money involvement (Creyer et al., 2003; Kwak et al., 2010; Spence & Brucks, 1997). Past betting experience can also be unreliable information to use in sport betting (Cantinotti et al., 2004). In addition, gambling experience, including exposure to gambling promotions and learning how to succeed in sport betting, leads to higher participation in risky activities (Creyer et al., 2003; Nyemcsok et al., 2022) and contributes to overconfidence that negatively impacts financial returns (Andersson et al., 2005; Combrink & Lew, 2019; Lopez-Gonzalez et al., 2020a). Thus, sport betting promotions usually include themes such as sport knowledge and expertise to enhance perceived control and confidence of bettors (Lopez-Gonzalez et al., 2018a).

In sport betting, betting experience can increase betting success as well as be an illusion of control. To date, the role of betting experience in the use of gambling promotional offers to form betting decisions is not clear. Using and taking advantage of promotional offers in sport betting is considered as a skill (Nyemcsok et al., 2022) and requires experience. Being exposed to a variety of new betting products and promotions, experienced bettors are more likely to carefully scrutinize the promotion information (Spence & Brucks, 1997; Dillon et al., 2001), search new and useful information (Brucks, 1985), and use analytical thinking to form betting decisions (D'Astous & Gaspero, 2015) than inexperienced sport bettors. Experienced bettors learn to avoid betting products that offer poor value in the long term (Newall et al., 2021b) and learn to be smart and strategic with promotions that could contribute to gambling success (Nyemcsok et al., 2022). They may also critically reflect on the risks associated with gambling promotions and can be more risk averse than those who are less experienced (MacCrimmon & Wehrung, 1990). In contrast, sport bettors who have a shorter history of sport betting and lack experience are more likely to bet on impulse during a sporting event (Hing et al., 2018c) and

exhibit a problem decision-making style (Linnet et al., 2010, 2012). Therefore, gambling inducements may be more influential in encouraging riskier bets among less experienced sport bettors. Study 2 tested the following hypotheses:

H4: Individuals' betting experience will moderate the effect of promotional offers on risk-taking: When sport bettors with less betting experience receive promotional offers, they will exhibit higher risk-taking than those with more betting experience when placing a bet.

3.2.3 Theoretical Framework: Framing Effect

The purpose of gambling promotional offers is to influence betting behavior and decision making through affecting bettors' judgment, benefit and risk perceptions, and actions (Emanuel et al., 2005). This study views gambling promotional offers as a marketing technique that frames betting decision problems differently and subsequently impacts betting decision making. While the money line or the uncertainty of outcome of the game does not change, its marketing messages frame risk potential and payout differently. Risk-free promotions focus on lowering risk perception among bettors while profit boost promotions emphasize greater earning potential. Study 2 employs framing effect to explain and predict the effect of promotional offers. Kahneman and Tversky (1979, 1992) developed prospect theory that provides an analysis of decision making under risk. People normally perceive outcomes as gains or losses from a neutral reference outcome. They exhibit risk seeking for small probabilities of gains and high probabilities of losses, and risk aversion for high probabilities of gains and small probabilities of losses. For example, people often prefer a smaller probability of winning a large prize over the expected value of that gamble. The overweighting of small probabilities contributes to the popularity of gambling. Therefore, sport bettors may simply prefer bets with higher potential

payouts, and one common sport betting advertising strategy is to promote long odds but high expected losses (Newall, 2015).

In addition, choice options can be presented in different ways, and a different presentation of decision problems can affect preferences. This tendency, called framing effect, leads to inconsistent decision making when the same choice is presented with different contextual cues. It is often possible to frame a decision problem in different ways. If people make rational decisions, their preferences should stay consistent and coherent even when the choice problems are presented with different situational cues (Tversky & Kahneman, 1981). Changes of frame should not affect the preference between options. However, decision makers are not normally aware of the potential effects of different decision frames on the relative attractiveness of options and their preferences. In order to simplify the decision making between gambles that involve complex probabilities, people tend to go through heuristic procedures, and the heuristics of choice may not optimally guide decision-makers to formal analysis. People often ignore components that are shared by all gambles or small differences and focus on the components that distinguish them. Thus, changes in decision frames affect evaluation of choice options and produce shifts of preference, yielding imperfections of decision (Tversky & Kahneman, 1981).

In prospect theory, framing and valuation are two phases in the choice process. In the framing phase, decision makers develop "a representation of the acts, contingencies, and outcomes that are relevant to the decision" (Tversky & Kahneman, 1992, p. 299). Decision problem framing affects decision makers' risk perception and their return expectations (Byrne, 2005; Sitkin & Weingart, 1995). In the valuation phase, decision makers assess the value of each prospect and choose accordingly, in which probabilities are replaced by decision weights. When

people place a bet on sporting events, they are facing a decision problem that they must choose the options, the possible outcomes of the options, and the probabilities that relate outcomes to the options (Tversky & Kahneman, 1981). Sport bettors facing a betting decision problem in different frames might conceive the risk, outcomes, and value associated with the betting selections differently and shift their choices, contrary to the invariance criterion of rational choice (Kahneman & Tversky, 1984). In sport betting, customers receive and view promotional offers before making a decision and placing a bet. If the game information and uncertainty remain constant, customers should be consistent in their betting choices. However, these promotional offers frame decision problems and gambling consequences in multiple ways (e.g., increased profits, no risk) before customers reach a decision, and even when the uncertain nature of a game does not change, the promotions can lead to inconsistent decisions.

Profit boost tokens and risk-free bets frame the possible outcomes of a gamble differently. Framing of gambling consequences impacts attitudes toward gambling and intentions to bet (Orazi et al., 2015) and change perceived risk and values of betting options (Kahneman & Tversky, 1984). Profit boost tokens frame the consequences of winning bets differently by promoting increased payouts. For example, a sport bettor receives a profit boost token to bet on a baseball game. If the betting odds and the winning probability of a team do not change, the bettor's decision should not change. However, the profit boost token facilitates the bettor to calculate the potential higher gains and perceive the changes in value of each option in using the offers (Lopez-Gonzalez et al., 2020a). With a profit boost token, the bettor may weigh the value of increasing potential payouts and perceive it as an opportunity to win more money, rather than contemplating the actual outcome of the baseball game. Hence, profit boost can change bettors'

perceptions regarding betting options, increasing their propensity for risk-taking and leading to riskier choices with higher winnings (Killick & Griffiths, 2022b; Rockloff et al., 2019).

Another promotional offer, risk-free bets frame the consequences of losing bets differently by offering sport bettors a second chance or stake back. With risk-free bets, if bettors lose the bet, they receive a free bet or credit to continue betting or simply receive their wager back. Without risk-free bets, bettors lose their wagers without getting anything back. Risk-free bets frame risky betting decision as "no risk", in which sport bettors have a sure gain of a second chance or money back. Since sport competitions involve uncertainty, risk-free bets become an opportunity for sport bettors to place riskier bets and chase for higher payouts that they may not have otherwise taken when there are no risk-free offers (Janvrin & Pempus, 2023). The "no risk" framing of gambling activities could be the reason why risk-free bets were found to be the most enticing and persuasive gambling advertising (Hing et al., 2017b) and the most influential promotional offers (Hing et al., 2019b). In addition, bettors may exhibit risk seeking for a smaller probability of higher payouts. Under the "no risk" framing, sport bettors can take more risks for increased profits than what they would normally do.

The effectiveness of message framing depends on specific contextual conditions (Orazi et al., 2015; Rothman & Salovey, 1997), and participants' responses to gambling promotions vary with the framing of promotional messages (Lamont et al., 2016). Both profit boost tokens and risk-free bets are positive framings that emphasize consumer benefits and gains and can lead to riskier betting decisions. However, these two types of promotional offer frame betting consequences in different ways, and willingness to take risk depends on how the potential outcomes are framed (Levin et al., 1998). Profit boost tokens frame the consequences of winning differently by emphasizing gains of higher financial rewards, while risk-free bets frame the

consequences of losing differently by emphasizing gains of money back. Sport bettors can take advantage of both promotional offers to potentially increase winnings, but the no-risk framing and security in risky activities can be more influential in increasing risk-taking levels than higher-profit framing.

The frame that a decision-maker adopts is controlled partly by the formulation of the problem and partly by the habits and personal characteristics of the decision-maker (Tversky & Kahneman, 1981). Individual differences predict responses to framing tasks and risky options (Levin et al., 2002). For instance, decision makers' thinking styles are related to framing effects, and individuals with complementary thinking or poor thinking are more prone to framing effects (Shiloh et al., 2002). Personality traits also impact reaction to framing effects (Levin et al., 2002). In addition, individual differences are predictors of gambling behavior and problem gambling (e.g., Chiu & Storm, 2010; Cooper et al., 2022; Moore & Ohtsuka, 1999). Orazi et al. (2015) found that framing of gambling consequences (gains vs. losses) in responsible gambling advertisements shows different effectiveness in reducing the propensity to bet toward different types of bettors. Individual differences tended to be ignored in prospect theory, and future research on individual differences and framing effect in gambling decision making is encouraged (Levin et al., 2002).

3.3 Methodology

3.3.1 Study Design and Stimuli

To investigate the interaction effect of promotional offers and sport bettor characteristics on bettors' risk-taking, I employed a between-subjects experimental design and manipulated promotional offers by offering profit boost tokens, risk-free bets, or no promotion in the betting decision-making process. Participants were recruited on Prolific and the experiment was

conducted online by using Qualtrics. To facilitate more real gambling and decision making, in Study 2, I provided participants with payouts if their bets settled as a win. Participants received $2 to place a bet, and the winnings were paid to participants through "Bonus Payment" on Prolific after the game ended. In this study, I used a regular season NBA game (i.e., Utah Jazz vs. Milwaukee Bucks) in January 2024 to create a betting task and asked participants to bet on the 10-point alternative spread of the basketball game (see Appendix C). Alternative spread refers to how many points a basketball team will win or lose by. For example, if participants bet on the Milwaukee Bucks at -10.5 with +100 odds, the team must win the game by more than 11 points for participants to win their bets. The choice of spread with short, medium, and long odds was used to represent bettors' risk-taking in previous studies (e.g., Rockloff et al., 2019). Short odds indicate a high probability of the event occurring and low payouts, while long odds indicate a low likelihood of winning and high potential payouts. Medium odds fall between short and long odds in terms of likelihood and potential payouts. In this study, the choice of alternative spread of the basketball game was used to measure participants' risk-taking level when they place a bet on the basketball game.

As seen in Table 3.1, a 10-point alternative spread was provided in the betting task, and participants were instructed to place a bet on one option from the 10-point scale. When the alternative spread decreased and the corresponding betting odds increased, it signified that the Milwaukee Bucks needed to win the game by more points, which was riskier but offered participants the opportunity for potentially higher payouts. Thus, in this betting task, Milwaukee Bucks -5.5 at -225 odds was the safest bet with the lowest payouts, while Milwaukee Bucks -14.5 at +170 odds was the riskiest bet with the highest payouts. In addition, sport betting is a risky activity, and bettors risk their money on the outcome of a game. In the context of sport

betting, larger wager amounts may indicate a higher propensity for risk-taking, as bettors are investing more money in their bets on uncertain outcomes. Participants' willingness to place the bet can be another reasonable proxy to represent sport bettors' risk-taking levels, as higher levels of willingness to place bets on uncertain outcomes and participate in risky activities can indicate a greater propensity for risk-taking among bettors. Therefore, in addition to the choice of alternative spread, I used willingness to place the bet and betting amount on the game if participants wagered with their own money to indicate participants' risk-taking level when they place a bet on the given NBA game.

Table 3.1

10-point Alternative Spread for the Betting Task

	Alternative Spread	Corresponding Betting Odds
1	Milwaukee Bucks -5.5	-225
2	Milwaukee Bucks -6.5	-195
3	Milwaukee Bucks -7.5	-165
4	Milwaukee Bucks -8.5	-140
5	Milwaukee Bucks -9.5	-120
6	Milwaukee Bucks -10.5	+100
7	Milwaukee Bucks -11.5	+115
8	Milwaukee Bucks -12.5	+130
9	Milwaukee Bucks -13.5	+150
10	Milwaukee Bucks -14.5	+170

The experiment used a 3-level between-subjects design and had three experimental conditions: control (no promotion) condition, profit boost condition, and risk-free bets condition. In the control condition, participants saw a 10-point alternative spread and the corresponding betting odds of the basketball game (see Appendix B). No promotional offer was provided in the

control condition. In the profit boost condition and risk-free bets condition, participants saw the same alternative spread and betting odds for the basketball game. In addition, in each condition, the promotional offer and its benefit were provided and displayed along with the game (See Appendix D). In the profit boost condition, participants received a 50% profit boost to their bet. For example, if a participant in the profit boost condition bets on the -230 odds and wins the bet, the participant receives $0.43 profit boost and a $3.3 total winning. In the risk-free bets condition, participants received a risk-free bet, and those who lost their bets received the stake back through "Bonus Payment" on Prolific. Typically, sportsbooks offer site credit or free bets to sport bettors if they lose. However, the online experiments were not able to recruit all the participants back and offered another betting opportunity after the conclusion of the game. Therefore, in the risk-free bets condition, I offered a stake back to participants who lost their bets. To test the framing effect of two promotions, participants were randomly assigned to one of the three conditions across different time points and bet on the same basketball games with the same betting options.

3.3.2 Participants and Procedures

I recruited participants (N = 375) through Prolific by offering $0.85 as compensation. Participants who won their bets received winnings through "Bonus Payment" on Prolific. I first conducted a prescreening survey by offering $0.15 as compensation to recruit participants who met the study criteria. In the prescreening survey, I used Prolific demographic prescreening filters to only allow participants who are located in the USA, older than 21, watching basketball / NBA regularly, and participating in sportsbook and sports betting to access the prescreening survey. In the survey, without telling participants the purpose of the main study, I asked participants which state they are currently in, what is the last time they placed a bet on NBA

games, and how often they watch NBA games. I screened out participants who reside in the states where sports betting is not legal since participants received payouts of their wagers. Additionally, I screened out participants who have never consumed NBA content or placed bets on basketball games. A total of 2,005 participants completed the prescreening survey, and 793 participants passed the prescreening. These qualified participants were invited to the Study 2 or Study 3 online experiment through their Prolific IDs. In the current study, 450 participants were invited, and 375 of them completed the online experiment during the data collection window. The Prolific IDs of the participants in Study 2 were recorded, and they were not invited and were not able to join the Study 3 online experiment so that I can prevent sample repetition across the two studies.

Participants in the main study were told that the researcher was interested in sport consumer behavior and decision making in sport betting. After consenting to participate in the study, participants first reported their familiarity with sport betting and the NBA, team identification with the teams in the experiment, betting frequency, betting expenditure, and betting apps used primarily (See Appendix F). Next, participants reported their risk-taking tendency and betting experience (See Appendix E).

Before the betting task, participants were asked to carefully read the betting instruction (See Appendix A) and were randomly assigned into one of the three between-subject betting odds conditions. The online experiment provided $2 for participants to bet on the game, and participants received the payouts after the game concluded if their bets settled as a win. Participants in the risk-free bets condition received $2 back through bonus payment if their bet settled as a loss. Participants did not risk their own money. The procedure is adapted from Rockloff et al. (2019) study, in which the research team provided participants with real money

($4) to bet on sports games and participants took the winnings at the end of the experiment. After reading the betting instruction, participants were instructed to view and bet on the alternative spread of the NBA game. If participants were assigned to the profit boosts condition and the risk-free bets condition, they saw the promotion messages displayed with the alternative spread and corresponding betting odds of the NBA game. After viewing the stimuli, participants first reported their betting selection (i.e., choice of alternative spread). Participants then indicated their willingness to place the bet and how much money they would wager on the game if they bet with their own money.

After reporting their betting decisions, participants indicated their perceived confidence and perceived risk about their wagers. At the end of the questionnaire, participants provided their demographic information (i.e., gender, age, and race), and they were informed that the alternative spread, betting odds, and promotional offers were created by DraftKings and the researcher, prepared only for research purposes. The findings of this study can help the researchers better understand how promotional offers and sport bettor characteristics affect risk-taking behavior in sports betting.

Data collection started two days before the game and stopped prior to the start of the game. During data collection, the betting lines of the basketball game remained steady. Participants received a $0.85 participation payment after completing the study and received their winnings in three business days after the game concluded.

3.3.3 Measures

Dependent variables in this study are betting selection (i.e., choice of alternative spread of the NBA game), willingness to bet (i.e., ‘What is your willingness to make the wager you just saw’; 0 – 100), and betting units (i.e., ‘Please indicate the maximum units you are willing to

wager if you bet with your own money'). These three dependent variables were used to indicate sport bettors' risk-taking levels when they place a bet on the NBA game. Previous betting behavior, team identification, and demographic measures are detailed in Appendix F. Familiarity questions asked if participants were familiar with sport betting, betting promotional offers, alternative spread, betting odds, betting on the NBA, the NBA, the Utah Jazz, and the Milwaukee Bucks, which were important elements in the betting task. Perceived confidence was measured by one item ('How confident do you feel that you will win more money'; 0 – 100). Perceived risk was measured by one item ('How risky do you feel about your wager'; 0 – 100). Perceived confident and perceived risk were assessed using sliders.

The moderating variables in this study are risk-taking tendency and betting experience. Risk-taking tendency was measured by the Risk Propensity Scale (RPS) developed by Meertens and Lion (2008). The RPS measures general risk-taking tendencies (e.g., "I prefer to avoid risk"; See Appendix E) and provides scores that yield good reliability and discriminant validity. The authors suggest that the RPS can be used in betting experiments and risky decision making research. Since this study investigates risk decision making in sport betting and people risk their money in betting, the item "I do not take risks with my health" was modified to "I do not take risks with my money." Betting experience was measured by three items adopted from existing studies (Byrne, 2005; D'Astous & Gaspero, 2015; Griffin et al., 1996; See Appendix E). The reliability of the betting experience scale was shown to be good in the previous studies (D' Astous & Gaspero, 2015; Griffin et al., 1996). In the current study, these three items asked participants to report if they were very experienced NBA bettor and their frequency of betting on NBA games. All items were assessed using a 5-point Likert scale ranging from '1 – Strongly Disagree' to '5 – Strongly Agree'.

3.3.4 Data Analysis

To test the proposed hypotheses, I tested a moderation model with two continuous moderators (Hayes, 2013). Moderation is to uncover the boundary conditions for a relationship between two variables. A moderator influences the magnitude of the causal effect of an independent variable on a dependent variable. In the proposed moderation model (Figure 3.1), the effect of promotional offers (X) on risk-taking (Y) is conditional on both risk-taking tendency (M1) and betting experience (M2). In other words, the effect of promotional offers depends on the level of sport bettors' risk-taking tendency and their betting experience. Dummy coding was used to convert the manipulated multi-categorical independent variable to two dummy variables for profit boost (X1) and risk-free bets (X2), with the control condition (no promotion) coded as the reference group. In this model, as seen in (1), β_1 estimates the main effect of profit boost (X1) on risk-taking (Y), and β_2 estimates the main effect of risk-free bets (X2) on risk-taking (Y). The main effects assess the overall impact of the promotional offers (X) on risk-taking (Y), averaging across all levels of the moderators.

The interaction terms (X1*M1, X1*M2, X2*M1, X2*M2) capture how the presence of the moderators modify the strength or direction of the relationship between the promotional offers (X) and risk-taking (Y). β_5 and β_6 estimate the interaction terms and indicate how much profit boost (X1)' effect is contingent on risk-taking tendency (M1) and betting experience (M2). β_5 quantifies how much the conditional effect of profit boost (X1) on risk-taking (Y) changes as risk-taking tendency (M1) changes by one unit, holding betting experience (M2) constant. β_6 quantifies how much the conditional effect of profit boost (X1) on risk-taking (Y) changes as betting experience (M2) changes by one unit, holding risk-taking tendency (M1) constant. If β_5 (or β_6) is statistically significant, the effect of profit boost (X1) on risk-taking (Y)

is different at different levels of the risk-taking tendency (or betting experience). Similarly, β_7 and β_8 estimates the interaction effect of risk-free bets (X2) and the two moderators in the model. If β_7 (or β_8) is statistically significant, the effect of risk-free bets (X2) on risk-taking (Y) is different at different levels of the risk-taking tendency (or betting experience). e is the error in estimation. Control variables (cov) were included in the regression model.

$$Y = i_1 + \beta_1 X1 + \beta_2 X2 + \beta_3 M1 + \beta_4 M2 + \beta_5 X1*M1 + \beta_6 X1*M2 + \beta_7 X2*M1 + \beta_8 X2*M2 + \beta_9 cov + e \quad (1)$$

I performed moderated regression analyses with R Studio and PROCESS macro for R. PROCESS for macro for R is a free and convenient regression-based analytical tool that automatically prepares data and has functions specific to testing interactions involving a multi-categorical variable (Hayes, 2013). The use of the PROCESS macro for R can greatly simplify the computations and minimize the potential error that exists when performing computations by hand. The research design of Study 2 included an experiment with three conditions where participants were randomly assigned to one of them. The independent variable is multi-categorical. The moderator variables and dependent variables are continuous. Betting selection (i.e., choice of alternative spread) is treated as a continuous variable since participants chose one option from the 10-point alternative spread, which indicates levels of risk-taking and is akin to a 10-point Likert scale. To properly test moderation hypotheses using regression analysis and visualize and probe interactions involving a multi-categorical independent variable and two continuous moderator variables, I followed the instruction suggested by Hayes and Montoya (2017). The Johnson-Neyman (JN) technique (Bauer & Curran, 2005; Johnson & Neyman, 1936) was used for probing the interaction. The JN technique generates the values along the continuum of M at which point the effect of promotional offers (X) on risk-taking (Y) is just statistically

significant. The values found separate the region of significance of the effect of promotional offers (X) on risk-taking (Y). Control variables (See Appendix F) were added in the tests of moderation. A list of control variables that were significantly related to the dependent variables were included in the PROCESS command (Nielsen & Raswant, 2018; VanderWeele & Shpitser, 2011).

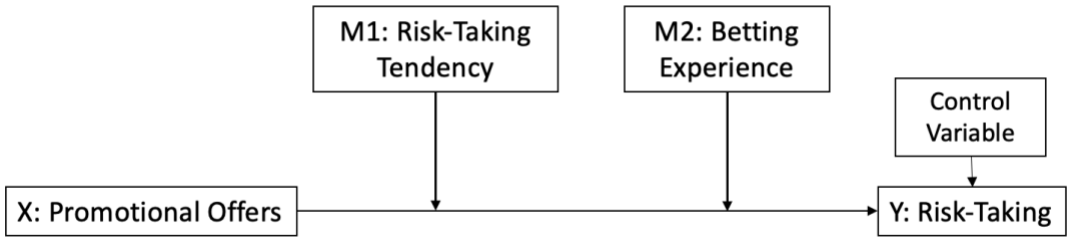
Following the moderation analysis, I visualized the moderation effects to provide insight into the nature of the interaction effects. I used the values in the output that indicated the relation between promotional offers (X) and risk-taking (Y) at 1 standard deviation below the mean, the mean, and 1 standard deviation above the mean of risk-taking tendency and betting experience to create plots for the interaction effects. The independent variable (promotional offers) was a three-level categorical variable. To better visualize and gain a better understanding of the interaction effects, I visualized the effect of risk-taking tendency (or betting experience) on the dependent variable in each of the three conditions in one plot. By plotting the interaction effects in this way, we can compare the effect of promotional offers at the different levels of the moderators, as well as the dependent variable at the same level of the moderator between the conditions. For subgroup analysis, a series of linear regressions were conducted for each condition to identify how risk-taking tendency (or betting experience) impacted the dependent variables under the three conditions. As seen in (2) and (3), b_1 estimates the effect of risk-taking tendency (M1) on risk-taking (Y), and b_3 estimates the effect of betting experience (M2) on risk-taking (Y).

$$Y = i_1 + b_1M1 + b_2cov + e \quad (1)$$

$$Y = i_1 + b_3M2 + b_4cov + e \quad (2)$$

Figure 3.1

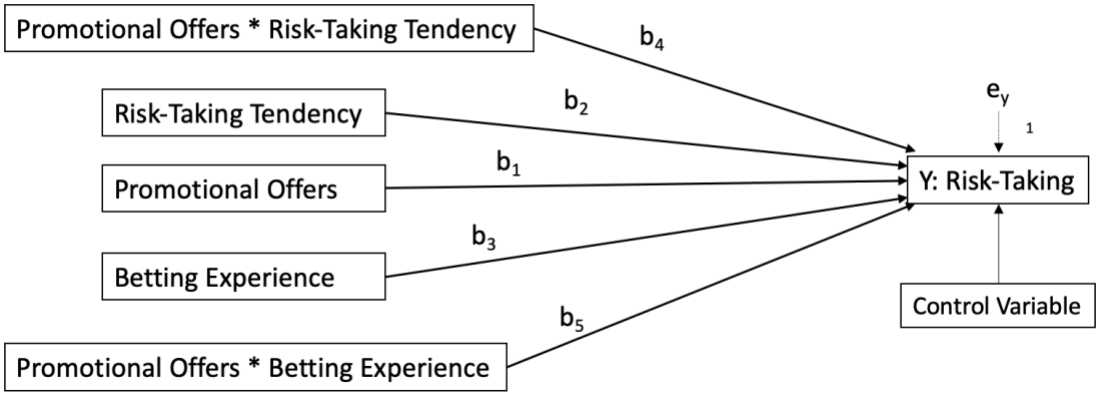
The Moderation Model with 2 Continuous Moderators in the Form of a Conceptual Model Adapted from Hayes (2013)



Note. X is the independent variable. Y is the dependent variable. M1 and M2 are two moderators.

Figure 3.2

The Moderation Model with 2 Continuous Moderators in the Form of a Statistical Model Adapted from Hayes (2013)



3.4 Results

In Study 2 (N = 375), the majority of the participants were male (80%) and Caucasian (67%). The average age was 39.52 (*SD* = 11.27). Participants were familiar with sport betting (*M* = 4.54, *SD* = 0.60) and the NBA (*M* = 4.60, *SD* = 0.61). A five-point Likert scale was used to measure participants' familiarity. All the participants reported that they have used at least one

online betting product or placed bets at local casinos. The sample in this study was average experienced NBA bettors (M = 3.48, SD = 1.09) and average risk-takers (M = 3.12, SD = 0.92). Thirty-four percent of participants indicated that they bet once a week or more, and forty-two percent indicated that they bet at least once a month but less than once a week. Most of the participants (74%) indicated that they usually bet $6 - $50 on one sports bet, and 15% of the participants reported that they usually bet $1 - $5 on one sports bet. Team identification with the Utah Jazz (M = 1.90, SD = 1.06) and the Milwaukee Bucks (M = 2.26, SD = 1.26) were low.

Factor analysis and confirmatory factor analysis (CFA) were used to identify latent variables in the study and confirm the validity and reliability of the measurement model. The familiarity questions were grouped into two latent variables: (1) familiarity with sport betting and (2) familiarity with the NBA. In the risk-taking tendency measures, "I really dislike not knowing what is going to happen" was removed due to low loading (0.47). As seen in Table 3.2, the measurement model showed a good reliability and validity.

Table 3.2

Constructs in the Measurement Model

Construct	Cronbach Alpha	AVE	omega
Risk-Taking Tendency	0.87	0.58	0.87
Betting Experience	0.84	0.67	0.85
Familiarity with Sport Betting	0.84	0.55	0.86
Familiarity with the NBA	0.80	0.73	0.88
Team Identification with Utah Jazz	0.92	0.80	0.92
Team Identification with Milwaukee Bucks	0.93	0.82	0.93

Acceptable Fit Indices: Chi-Square test of model fit $\chi 2 = 735.03$ ($p < .05$), CFI = 0.90, RMSEA = 0.08, SRMR = 0.06

The control variables added in the analysis were familiarity with sport betting, familiarity with the NBA, betting frequency, betting expenditure on one sports bet, and demographics (i.e., gender, race, and age). In this study, the control variables were all weakly correlated with the dependent variables (i.e., betting selection, willingness to bet, and betting units). Risk-taking tendency was weakly correlated with betting experience ($r = 0.38$).

3.4.1 Dependent Variable: Betting Selection (i.e., Choice of Alternative Spread)

Linear regression was first conducted to identify which control variables were significantly related to betting selection (i.e., choice of alternative spread). As discussed earlier, Milwaukee Bucks -5.5 at -225 odds was the safest bet, while Milwaukee Bucks -14.5 at +170 was the riskiest bet. Choosing higher points and longer odds indicate riskier choices since the Milwaukee Bucks needed to win by more points. As seen in Table 3.3, results showed that betting expenditure on one sports bet ($p = 0.03$, $b = 0.23$) and familiarity with the NBA ($p = .007$, $b = -0.73$) were significantly related to betting selection. These two variables were added as covariates to the two-moderator model. In addition, risk-taking tendency was significantly related to betting selection ($p = 0.01$, $b = 0.42$). Participants with a higher risk-taking tendency placed riskier bets. Betting experience was not significantly related to betting selection ($p = 0.68$, $b = -0.08$).

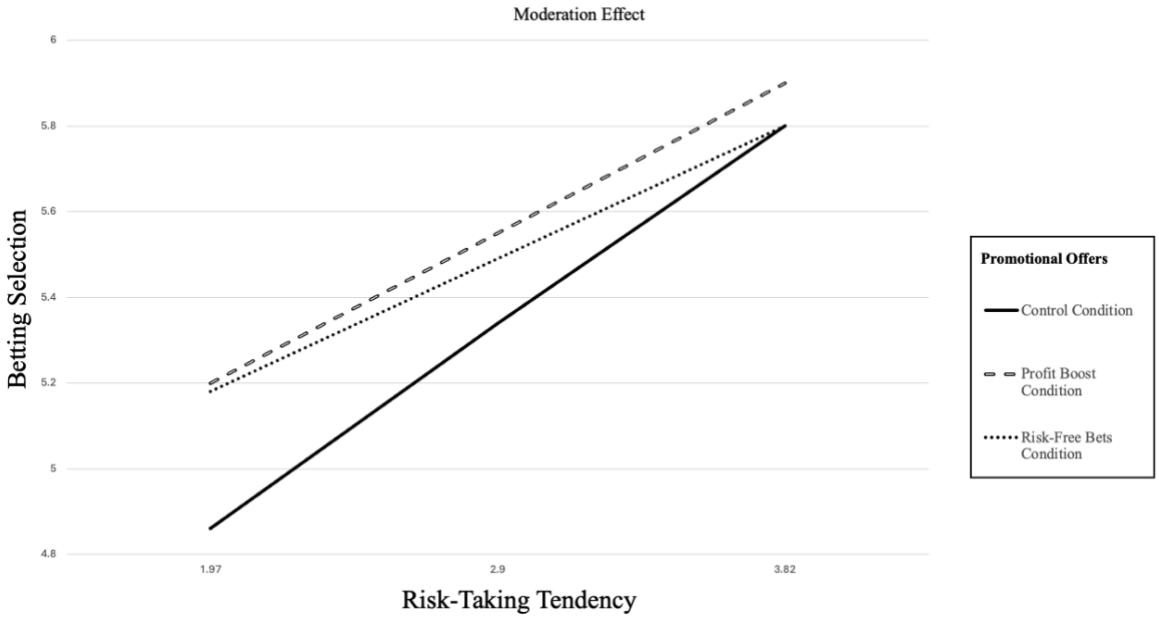
Model 2 (moderation analysis with 2 continuous moderators) of the Hayes Process Macro was performed. Results showed that promotional offers did not have a main effect on betting selection. Promotional offers did not significantly induce participants to place riskier bets. Compared to the control condition, participants in the profit boost condition ($p = 0.57$, $\beta = 0.20$) and risk-free bets condition ($p = 0.69$, $\beta = 0.14$) placed slightly riskier bets. Therefore, H1 and

H2 are rejected when betting selection was used to represent risk-taking levels when participants placed a bet.

As seen in Table 3.4, results indicated that there was no significant interaction effect between promotional offers and risk-taking tendency on betting selection. The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation effect (Figure 3.3). A series of linear regressions were also conducted for each condition to identify the effect of risk-taking tendency under the three conditions (Table 3.5). In all conditions, participants with a higher risk-taking tendency placed slightly riskier bets. Therefore, H3 is rejected when betting selection was used to represent risk-taking levels when participants placed a bet.

Figure 3.3

Moderation Effect of Promotional Offers and Risk-Taking Tendency on Betting Selection



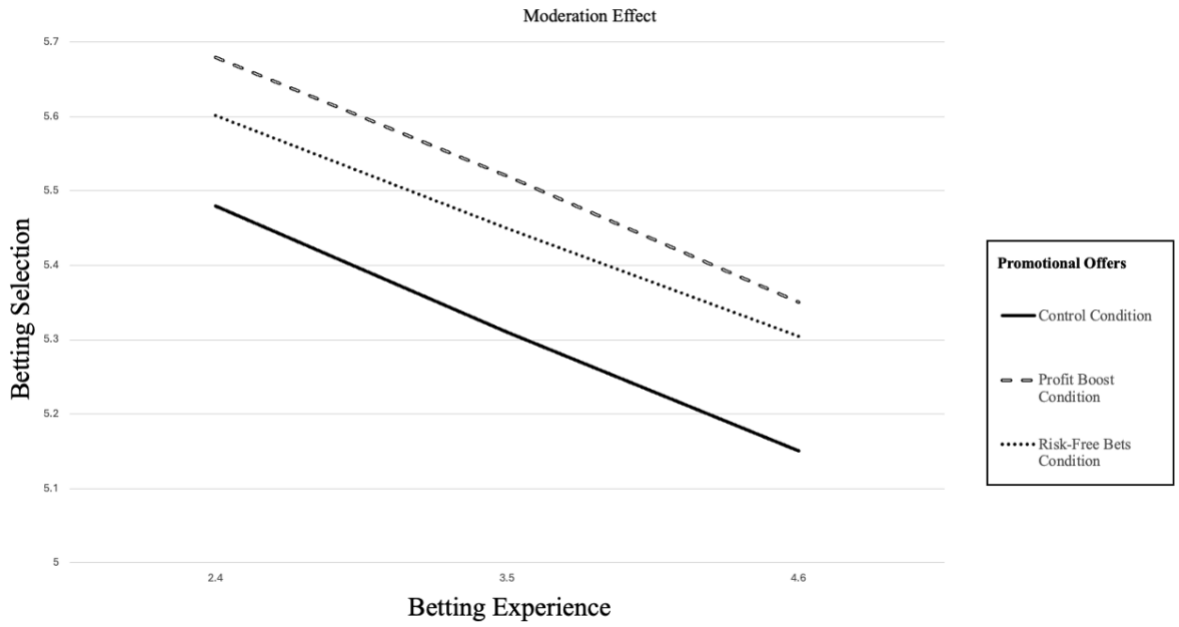
As seen in Table 3.4, results indicated that there was no significant interaction effect between promotional offers and betting experience on betting selection. The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation

effect (Figure 3.4). A series of linear regressions were also conducted for each condition to identify the effect of betting experience under the three conditions (Table 3.5). In the control and profit boost conditions, participants with more betting experience placed slightly less risky bets. Therefore, H4 is rejected when betting selection was used to represent risk-taking levels when participants placed a bet.

Given the positive correlation between the two moderators (r = 0.38), the Variance Inflation Factor (VIF) was calculated for all predictors in the model. The VIF values for risk-taking tendency and betting experience were 4.27 and 3.56, respectively, indicating that multicollinearity was not a significant concern in the regression model.

Figure 3.4

Moderation Effect of Promotional Offers and Betting Experience on Betting Selection



3.4.2 Dependent Variable: Willingness to Bet

Linear regression was first conducted to identify which control variables were significantly related to willingness to bet (i.e., participants' willingness to place the bet). As seen in Table 3.3, results showed that age ($p = 0.04$, $b = 0.25$), betting frequency ($p = 0.008$, $b = 2.35$), and familiarity with sport betting ($p = 0.02$, $b = 6.72$) were significantly related to willingness to bet. These three variables were added as covariates to the two-moderator model. Risk-taking tendency ($p < .001$, $b = 4.18$) and betting experience ($p = 0.01$, $b = 4.71$) significantly increased participants' willingness to place the bet.

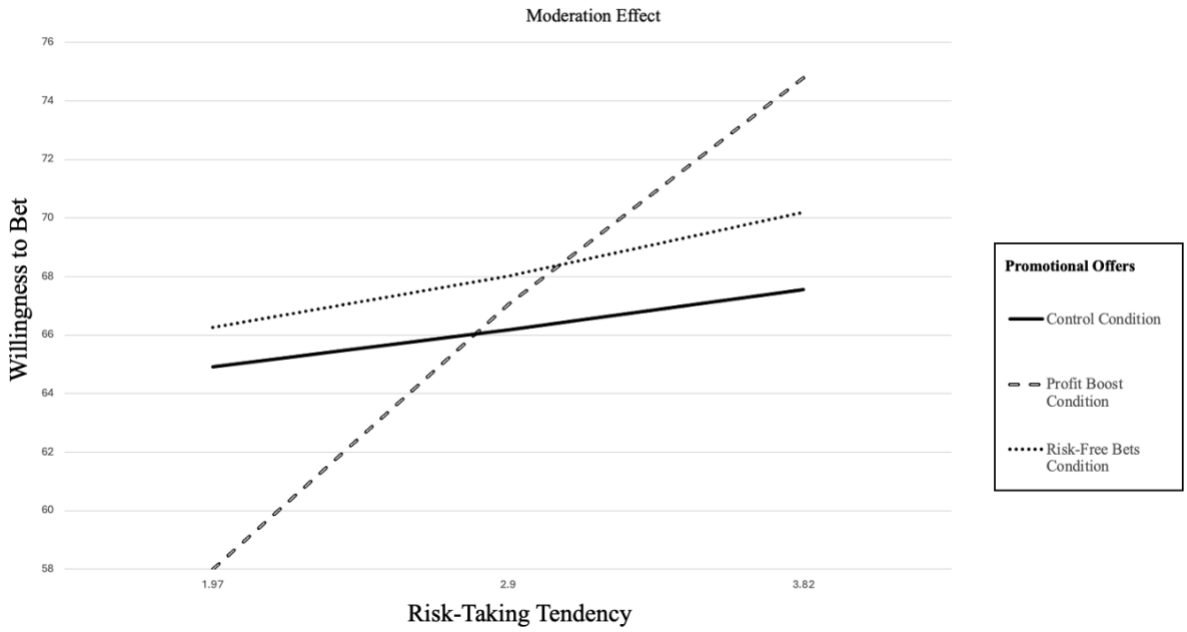
Model 2 of the Hayes Process Macro was performed. Results showed that promotional offers did not have a main effect on the willingness to place the bet. Promotional offers did not significantly increase the willingness to place the bet. Compared to the control condition, participants in the profit boost condition ($p = 0.94$, $\beta = 0.24$) and risk-free bets condition ($p = 0.56$, $\beta = 1.95$) were slightly more willing to place the bet. Therefore, H1 and H2 are rejected when willingness to bet was used to represent risk-taking levels when participants placed a bet.

As shown in Table 3.4, results indicated an interaction effect between profit boost tokens and risk-taking tendency on willingness to bet ($p = 0.08$, $\beta = 7.32$). The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation effect (Figure 3.5). Profit boost tokens increased willingness to bet among sport bettors who have a higher risk-taking tendency, and vice versa. A series of linear regressions were also conducted for each condition to identify the effect of risk-taking tendency under the three conditions (Table 3.5). In the control and risk-free bets conditions, risk-taking tendency did not significantly increase participants' willingness to place the bet. In contrast, in the profit boost condition, participants with a higher risk-taking tendency were significantly more willing to place the bet (*p*

= 0.002, *b* = 8.71). Therefore, H3 fails to be rejected when the willingness to bet was used to represent risk-taking levels when participants placed a bet.

Figure 3.5

Moderation Effect of Promotional Offers and Risk-Taking Tendency on Willingness to Bet

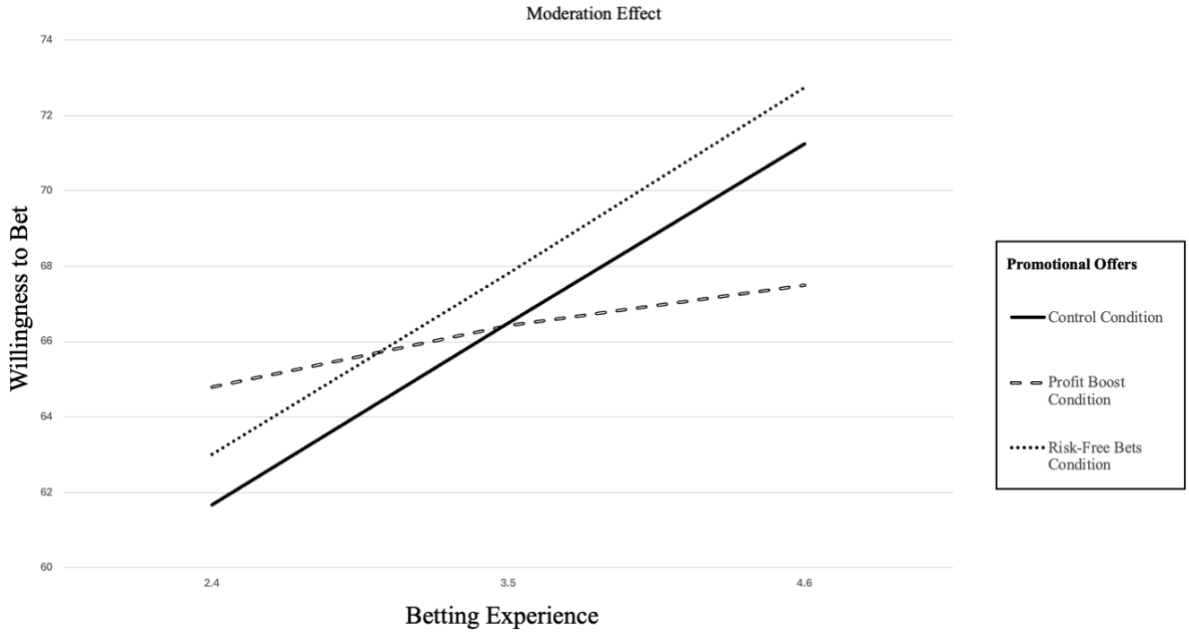


As shown in Table 3.4, there was no significant interaction effect between promotional offers and betting experience on willingness to bet. The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation effect (Figure 3.5). A series of linear regressions were also conducted for each condition to identify the effect of risk-taking tendency under the three conditions (Table 3.5). In all conditions, participants with more betting experience were more willing to place the bet. In the risk-free bets condition, betting experience significantly increased willingness to bet (p = 0.05, b = 5.07). Therefore, H4 is rejected when willingness to bet was used to represent risk-taking levels when participants placed a bet since there was no interaction effect. The VIF values for risk-taking tendency and

betting experience were 4.20 and 5.14, respectively, indicating that multicollinearity was not a significant concern in the regression model.

Figure 3.6

Moderation Effect of Betting Experience on Willingness to Bet



3.4.3 Dependent Variable: Betting Units

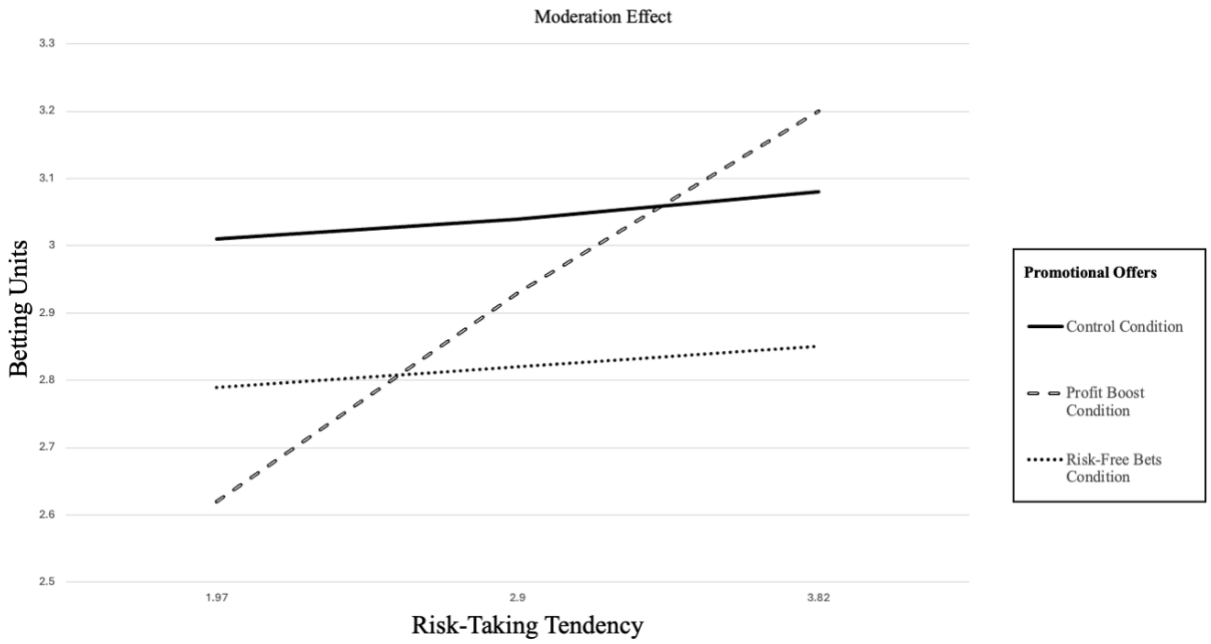
Linear regression was first conducted to identify which control variables were significantly related to betting units (i.e., the maximum units that participants were willing to wager if they bet with their own money). As seen in Table 3.3, results showed that age (p = 0.02, b = 0.01) and team identification with the Milwaukee Bucks (p = 0.02, b = 0.17) were significantly related to betting units. These two variables were added as covariates to the two-moderator model. Both risk-taking tendency (p = 0.08, b = 0.13) and betting experience (p = 0.19, b = 0.08) increased betting units.

Model 2 of the Hayes Process Macro was performed. Results showed that promotional offers did not have a main effect on the betting units. Participants who received profit boost tokens or risk-free bets would not wager significantly more money on the game if they bet with their own money. Interestingly, compared to the control condition, participants in the profit boost condition (p = 0.42, β = -0.14) and risk-free bets condition (p = 0.19, β = -0.22) would wager slightly less money on the game. Therefore, H1 and H2 are rejected when betting units were used to represent risk-taking levels when participants placed a bet.

As seen in Table 3.4, there was no significant moderation effect of profit boost and risk-taking tendency (p = 0.17, β = 0.28). The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation effect (Figure 3.7). Profit boost tokens increased betting units among sport bettors who have a higher risk-taking tendency, and vice versa. A series of linear regressions were also conducted for each condition to identify the effect of risk-taking tendency under the three conditions (Table 3.5). In the control and risk-free bets conditions, participants with a higher risk-taking tendency would not wager more money. However, in the profit boost condition, participants with a higher risk-taking tendency would wager more money than those with a lower risk-taking tendency (p = 0.09, b = 0.18). Therefore, H3 fails to be rejected when betting units were used to represent risk-taking levels when participants placed a bet.

Figure 3.7

Moderation Effect of Promotional Offers and Risk-Taking Tendency on Betting Units



As seen in Table 3.4, there was an interaction effect of profit boost and betting experience on betting units (p = 0.07, β = -0.30). The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation effect (Figure 3.8). Profit boost tokens increased betting units among sport bettors who have less betting experience, and vice versa. As seen in Table 3.5, in the profit boost condition, participants with more betting experience would wager less money on the game if they bet with their own money. In contrast, in the risk-free bets condition, participants with more betting experience would wager significantly more money on the game if they bet with their own money (p = 0.01, b = 0.26). Therefore, when betting units were used to represent risk-taking levels when participants placed a bet and when profit boost tokens were provided, H4 fails to be rejected. The VIF values

for risk-taking tendency and betting experience were 4.26 and 3.58, respectively, indicating that multicollinearity was not a significant concern in the regression model.

Figure 3.8

Moderation Effect of Promotional Offers and Betting Experience on Betting Units

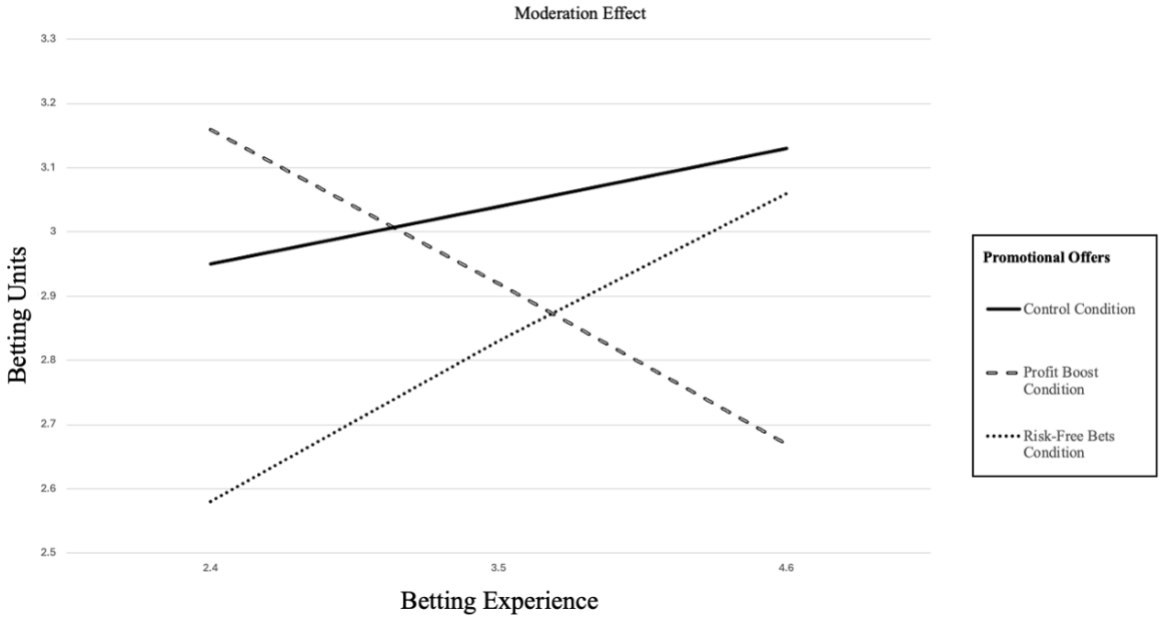


Table 3.3

Regression Analyses of the Effects of Control Variables and Moderators on the Dependent Variables

Variables	Betting Selection		Willingness to Bet		Betting Units	
	b	*t*	*b*	*t*	*b*	*t*
Betting Expenditure on One Sports Bet	0.23**	2.13	0.72	0.70	-0.02	-0.36
Familiarity with the NBA	-0.73**	-2.69	0.71	0.27	-0.16	-1.25
Familiarity with Sport Betting	0.42	1.34	6.72**	2.23	0.18	1.20
Betting Frequency	0.00	0.00	2.35**	2.65	0.02	0.52
Team Identification with the Milwaukee Bucks	0.05	0.35	2.04	1.48	0.17**	2.39
Team Identification with the Utah Jazz	-0.16	-0.94	-1.79	-1.07	-0.05	-0.62
Age	0.00	0.16	0.25**	2.05	0.01**	2.23
Risk-Taking Tendency	0.42**	2.50	4.18***	2.69	0.13*	2.33
Betting Experience	-0.08	-0.54	4.71**	2.40	0.08	1.30
N	375		375		375	
R^2	0.04		0.08		0.02	

Note. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. Neither gender nor race had a significant relationship with betting selection. * $p < .10$. ** $p < .05$. *** $p < .001$.

Table 3.4

Interaction Effect on the Dependent Variables

Variables	Betting Selection		Willingness to Bet		Betting Units	
	β	*t*	*β*	*t*	*β*	*t*
Betting Expenditure on One Sports Bet	0.16	1.41	0.28	0.23	-0.04	-0.77
Familiarity with the NBA	-0.77**	-2.84	0.61	0.24	-0.18	-1.43
Age	0.00	0.28	0.32**	2.53	0.02**	2.53
Betting Frequency	-0.02	-0.20	0.18	0.15	0.00	0.08
Familiarity with Sport Betting	0.40	1.05	4.84*	1.57	0.17	1.08
Team Identification with the Milwaukee Bucks	-0.01	-0.12	0.54	0.49	0.13**	2.29
Risk-Taking Tendency	0.46	1.28	1.59	0.52	0.04	0.24
Betting Experience	-0.09	-0.31	4.69*	1.61	0.08	0.51
Profit Boost	0.20	0.57	0.24	0.07	-0.14	-0.81
Risk-free Bets	0.14	0.40	1.95	0.58	-0.22	-1.30
Profit Boost * Risk-Taking Tendency	-0.10	-0.22	7.32*	1.75	0.28	1.34
Risk-Free Bets * Risk-Taking Tendency	-0.14	-0.34	0.72	0.18	-0.01	-0.03
Profit Boost * Betting Experience	0.00	0.00	-3.17	-0.96	-0.30*	-1.78
Risk-Free Bets * Betting Experience	0.02	0.04	-0.06	-0.02	0.14	0.83
N	375		375		375	
R^2	0.05		0.12		0.08	

Note. The control condition (no promotion) was coded as baseline. Each regression model only included control variables that were significantly related to the dependent variable. *β* indicates the standardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. * $p < .10$. ** $p < .05$.

Table 3.5

Follow-up Subgroup Analysis: The Effect of Two Moderators on the Dependent Variables in Each Condition

Condition	Variables	Betting Selection		Willingness to Bet		Betting Units		N
		b	*t*	*b*	*t*	*b*	*t*	
Control Condition	Risk-taking Tendency	0.44	1.30	0.90	0.27	-0.03	-0.17	124
Profit Boost Condition		0.46	1.53	8.71**	3.14	0.27*	1.89	125
Risk-Free Bets Condition		0.38	1.51	1.75	0.73	0.07	0.64	126
Control Condition	Betting Experience	-0.08	-0.32	4.55	1.10	0.18	1.37	124
Profit Boost Condition		-0.19	-0.78	1.41	0.39	-0.18	-1.52	125
Risk-Free Bets Condition		0.03	0.14	5.07*	1.70	0.26**	2.46	126

Note. The control variables were included in each regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. * $p < .10$. ** $p < .05$.

3.4.4 Multicollinearity Issues and Robustness Check

Although the VIF values were below 5 and indicated that multicollinearity is not a significant issue (Neter, et al., 1989), multicollinearity can still be a concern in the two-moderator model. Therefore, I ran one-moderator models that only included one moderator at a time to detect if the significance of the interaction terms changed. The results of the one-moderator models were shown in Appendix G. The one-moderator models did not show any significant interaction effects that were not detected in the two-moderator model. Therefore, I proceeded to interpret and discuss the results from the two-moderator model.

3.4.5 Summary of Results

The results showed that profit boost tokens and risk-free bets did not significantly induce participants to place riskier bets, be more willing to place the bet, or wager more money if they bet with their own money. However, the results revealed an interesting interaction effect of promotional offers and risk-taking tendency: (1) while profit boost tokens did not have a main

effect on willingness to bet or betting units, the promotion increased willingness to bet and betting units among sport bettors who have a higher risk-taking tendency, and vice versa; (2) when sport bettors received profit boost tokens, sport bettors with a higher risk-taking tendency placed riskier bets, would wager more money, and were more willing to place the bet than those with a lower risk-taking tendency; (3) when sport bettors received risk-free bets, high- risk takers still placed riskier bets than low- risk takers, but there was no significant difference in willingness to bet and betting units between low- and high- risk takers.

At the same time, the results revealed an interesting interaction effect of promotional offers and betting experience: (1) while profit boost tokens did not have a main effect on betting units, the promotion increased betting units among sport bettors who have less betting experience, and vice versa; (2) in other words, when sport bettors received profit boost tokens, sport bettors with less betting experience would wager more money than those with more betting experience; (3) in contrast, when sport bettors received risk-free bets or no promotional offers, sport bettors with less betting experience would wager less money than those with more betting experience; (4) in all conditions, sport bettors with more betting experience placed less risky bets and were more willing to place the bet.

3.5 Discussion

The overall purpose of Study 2 was to first determine the effect of two commonly used promotional offers in the betting market, profit boost tokens and risk-free bets, on sport bettors' risk-taking when they bet on sporting events. The risk-taking level was measured by participants' choice of bets on alternative spread of a basketball game, their willingness to place the bet, and how much money they would wager on the game if they used their own money. In addition, this study uncovered if sport bettors' risk-taking tendency and betting experience enhance or mitigate

the effect of promotional offers on their risk-taking. Compared to Study 1, Study 2 created a more real gambling situation by providing $2 for participants to bet on an NBA game and sending winnings to participants after the game concluded. The findings of the current study did not support my predictions regarding the effect of promotional offers, as none of the promotional offers significantly increased or decreased participants' risk-taking when participants received $2 to bet on the game. However, the results revealed an interesting interaction between sport bettor characteristic and promotional offers, suggesting that the effect of gambling promotional offers varies among different groups of sport bettors.

Regarding the main effect of promotional offers, this outcome may suggest that when sport bettors bet a small amount of money (e.g., $2), their choice of bets, betting expenditure, and willingness to place the bet are not significantly influenced by the promotional offers they receive. In the experiment, risk-free bets and profit boost tokens only slightly increased riskier bets and willingness to bet. After all, betting $2 on the game with the promotional offers did not greatly increase participants' potential winnings. If participants wagered a higher amount of money, the effect of the promotional offers might be more pronounced. Study 3 will replicate Study 2 by using a new payout structure that offers participants $5 to bet on the game. It is interesting that when participants were asked to report how much money they would wager on the game if they bet with their own money, participants who received the promotional offers would wager slightly less money on the game. Further investigation is needed to uncover betting expenditure on a game with gambling promotional offers and could provide interesting insights for sportsbook operators.

Concerning the choice of bets and wager amount on the game, sport bettors with less betting experience placed riskier bets under the effect of promotional offers than those with more

betting experience. They would also wager more money when they received profit boost tokens. The riskier decisions could lower the willingness to place the bet. In addition, it is interesting that profit boost tokens did not significantly increase wager amount on the game, but we see a positive effect among less experienced sport bettors. Previous studies found that sport bettors who have less experience in betting are more impulsive (Hing et al., 2018c), while experienced bettors are more likely to carefully scrutinize gambling promotions and reflect on the risk associated with these promotions (Newall et al., 2021b; Nyemcsok et al., 2022). Less experienced sport bettors may overlook the potential risk associated with the promotional offers, and their decisions are more likely to be influenced by the sensational wording in the promotional message, such as "win more money!". Thus, less experienced sport bettors may exhibit higher levels of risk-taking for increased profits. In contrast, experienced sport bettors may choose to be conservative to secure winnings and show a less tendency to risk more money for profit boost. Another interesting finding is that when receiving risk-free bets, sport bettors with more betting experience would wager more money. Risk-free bets seem to be a good opportunity for experienced sport bettors to wager more money since they may continually bet on sports. In summary, low-risk promotions seem to be more appealing to more experienced sport bettors and increase their wager amounts, while higher-winning promotions appear to be more effective toward less experienced sport bettors in increasing their wager amounts and choice of riskier bets.

Regarding the moderating role of risk-taking tendency, although profit boost tokens did not significantly increase willingness to bet or wager amount, the promotion showed a positive effect among high- risk takers and a negative effect among low- risk takers. In contrast, risk-free bets appeared to have a more positive effect among low- risk takers. High- risk takers showed

more willingness to bet, placed riskier bets, and would wager more money than low- risk takers when they received profit boost tokens. However, when receiving risk-free bets, high- risk takers still placed riskier bets, but there was no significant difference in willingness to place the bet and wager amount on the game. Individuals who have a higher risk-taking tendency have a higher tolerance of risk and view risks as more appealing and exciting (Bromiley & Curley, 1992; Knowles, 1976; Nicholson et al., 2005; Sitkin & Weingart, 1995). They are sensation seekers and are willing to participate in higher-risk gambling to achieve higher-level goals (Mishra et al., 2017; Nicholson et al., 2005; Zuckerman & Kuhlman, 2000). Compared to risk-free bets, betting with profit boost tokens seems more lucrative and exciting but without a second chance. Thus, profit boost tokens may be more appealing and influential to sport bettors who have a higher risk-taking tendency. Low- risk takers are likely to avoid risk and look for security, and profit boost tokens would in turn decrease their risk-taking.

In contrast, risk-free bets reduce perceived risk and do not provide exciting goals to achieve, such as higher winnings, and the promotion may not be attractive to high- risk takers or influential on their wager amounts. Low- risk takers are sensitive to risk and have low tolerance of risk (Sitkin & Weingart, 1995). Risk-free bets mitigate risk perceptions by offering credit back, and the reduced risk in the message can effectively lower perceived risk in low- risk takers (Kemp et al., 2015) and consequently increase their betting involvement. Thus, risk-free bets appeared to be more influential than profit boost tokens among low- risk takers, and risk-reduced gambling promotions can be effective in increasing low- risk takers' willingness to participate in sport betting and their wager amounts.

The current study did not find an interaction effect between promotional offers and betting experience on willingness to bet. Sport bettors with more experience exhibited a greater

willingness to place the bet when they received promotional offers. As gambling promotional offers are one of the most used marketing techniques by sportsbooks in the U.S., taking advantage of promotional offers is becoming an important part of sport betting and is considered as a skill (Nyemcsok et al., 2022). Experienced sport bettors may have frequently used gambling promotional offers before and think they have a good understanding of these offers. They may feel confident in utilizing the offers and view them as an opportunity to increase winnings. Sport bettors who have less betting experience may not be familiar with gambling promotional offers, and their willingness to bet may not increase due to lack of knowledge and experience. The results suggest that promotional offers may be more effective among sport bettors who have more betting experience in increasing their betting involvement.

Lastly, either risk-taking tendency or betting experience alone significantly increased participants' willingness to place the bet and the amount of money they would wager on the game. Sport betting is a risky activity, which may be more appealing to high- risk takers. Meanwhile, sport betting is argued to be a form of gambling that requires skill, experience, and knowledge (e.g., Brown & Reade, 2019). Sport bettors who have more betting experience may think they have more knowledge and expertise, which increase their confidence and money involvement (Creyer et al., 2003; Nyemcsok et al., 2022; Spence & Brucks, 1997). Thus, risk-taking tendency and betting experience play an important role in the decision-making process when people bet on sports, and they could potentially influence the effect of promotional offers or other external factors on bettors' risk-taking behavior.

3.5.1 Theoretical Significance

The current study contributes to sport betting literature by identifying the important role of risk-taking tendency and betting experience in the use of promotional offers to make betting

decisions. By using a real NBA game and providing real payouts in the experiment, this study provides further insights on whether betting promotions increase riskier bets and willingness to place a bet when targeting different customers. When sport bettors wager a small amount of money (e.g., $2) on the game, gambling promotional offers may not significantly increase their risk-taking when they place a bet. Instead, sport bettor characteristics appear to play a more important role in the decision-making process. Risk-taking tendency and betting experience influence sport bettors' choice of bets, betting expenditure, and willingness to participate in sport betting, and these traits moderate the effect of promotional offers. Sport bettors' higher risk-taking tendencies enhance the effectiveness of profit boost tokens, while their betting experience reduce the effect of these tokens on their risk-taking levels when placing a bet. The findings suggest that high winning promotion seems to be more effective to sport bettors with a higher risk-taking tendency or less experience, while risk-reduced promotions may work better among low- risk takers and experienced sport bettors.

The findings of this study also advance our understanding of how customers react to marketing techniques in sport betting. Today, sport bettors are learning to take advantage of gambling promotions (Nyemcsok et al., 2022). At the same time, sport betting is a risky activity that may require skills and experience, and therefore, customers' risk-taking tendency and betting experience are two important personal characteristics to consider in customized gambling marketing. For instance, experienced sport bettors can be more careful with the marketing techniques that sportsbooks employ. Low-risk promotions or advertising can be an effective strategy to encourage low- risk takers to participate in sport betting. To develop effective marketing strategies in sport betting, it is critical to identify sport bettor characteristics that can predict customer responses to gambling promotions.

The current study uses framing effect as the theoretical framework to understand how promotional offers may frame sport betting consequences differently (e.g., higher winnings or stake back after losing) and shift sport bettors' decisions and risk-taking levels. Although this study did not find a significant effect of either promotional offer on sport bettors' risk-taking, sport bettors with different levels of betting experience and risk-taking tendency demonstrated varied susceptibility to framing effect in sport betting promotions. Framing of gambling consequences may not have an overall effect, but it shows effectiveness toward certain types of bettors. These two characteristics in framing effect highlight variations in how different sport bettors respond to framed information and betting decision problems. In line with previous studies (e.g., Levin et al., 2002; Orazi et al., 2015), the findings suggest that personal characteristics of the decision maker play an important role in framing effect (Tversky & Kahneman, 1981), and these characteristics should not be ignored in understanding the effectiveness of framing effect and decision making under risk. In sport betting, risk-taking tendency and betting experience are two important characteristics in decision-making models and influence how decision makers respond to marketing framing.

3.5.2 Practical Implications

Although no significant effect of promotional offers was found, this study provides sportsbook operators with information about how promotional offers may function when the wagers are low. In the current dataset, most participants (85%) usually bet more than $5 on one sport bet. Wagering $2 on the alternative spread with or without promotional offers did not seem to increase considerable winnings that would attract these sport bettors. This could be the reason why no significant effect of promotional offers was found. Sportsbooks usually set a maximum bet at $5 or $10 when sport bettors use promotional offers to place bets. This is a strategy to

protect sportsbooks from losing money. However, sportsbooks should be aware that when customers place bets with promotional offers, they may wager a smaller amount of money than what they typically do, and the low financial incentives might not significantly increase their willingness to bet and their propensity for riskier choices.

The interaction effects found in this study suggest that customized marketing should be considered in the design and planning of gambling promotions and other marketing techniques. To maximize the effectiveness of gambling promotions, it is important to segment customers into groups based on their personal characteristics that importantly impact their reactions to inducements and develop personalized strategies. For example, to target customers who are new to sport betting or are reluctant to bet on sports, low-risk and risk-reduced promotions and advertising can effectively increase their willingness to participate in sport betting. To target high- risk takers, exciting incentives such as high winnings can be effective in increasing their betting expenditure. In addition, among experienced sport bettors, promotional offers are an important marketing technique to encourage sustainable participation in sport betting. Experienced sport bettors may not wager more money or place riskier bets when using promotional offers, but they show a greater willingness to place bets when they receive promotional offers. Therefore, sportsbooks should focus on identifying important sport bettor characteristics and employing personalized marketing to retain customers and increase their involvement on the betting platforms, which could benefit long-term profits.

In addition to risk-taking tendency and betting experience, the findings suggest the importance of customers' betting habits, knowledge, and demographics, which can significantly influence their decision making and participation in sport betting. The current study revealed that sport bettors' knowledge such as familiarity with sport betting and the sport, betting expenditure

on one sport bet, age, and team identification can significantly influence how sport bettors bet on sports. While sportsbooks may not be able to collect and access customers' personal data, sportsbooks can gain a better understanding of sport bettor characteristics from customers' previous betting behavior and betting patterns on the platforms. These insights may help predict sport bettors' reactions to gambling marketing techniques and their decision making, which could assist the planning of operational and marketing strategies accordingly.

Meanwhile, the results inform gambling regulation authority that gambling promotional offers may be used to target vulnerable consumer segments. The findings suggest that sport bettors who have less betting experience or love to take risks might make riskier decisions when they place bets under the effect of promotional offers. To better protect consumers from aggressive marketing, the gambling regulation authority is taking steps to prevent misleading languages in gambling promotions (e.g., Greenberg, 2023). In addition, the authority can identify vulnerable sport bettor groups and increase awareness of the potential risks associated with betting and promotional offers among these customers.

3.6 Limitations and Future Studies

The findings of the current study might be limited to situations where sport bettors bet a small amount of money (e.g., $2) on a game. Study 3 will increase the betting amount to $5 and further investigate the effect of promotional offers. The results may also be confined to sport bettors who have previously bet on the NBA and consumed NBA content. I recruited participants on Prolific, and the betting task asked participants to bet on the alternative spread of an NBA game. The concept of alternative spread might not be familiar to non-bettors. People lacking knowledge or experience in sport betting and the NBA might randomly select responses in order to complete the online experiment for compensation, which could introduce noise into the

dataset. Therefore, the current study did not recruit non-bettors or non-NBA bettors. One important goal of betting promotional offers is to attract new customers, but with the current sample, I was not able to examine if these promotions were influential on non-bettors or non-NBA bettors in increasing their willingness to bet or betting expenditure. To provide insight into betting decision making of non-bettors under the effect of promotional offers, future research can consider employing simpler betting tasks for new and non-bettors (e.g., betting on which team will win the game or which player will win a tennis tournament) in an experiment or use survey studies to understand how promotional offers may lure non-bettors to bet on sports and risk their money.

Another limitation of the current sampling is that all the participants engaged in sport betting, and the sample may generally exhibit high in risk-taking tendencies and betting experience. As mentioned in the results section, the average of betting experience of the sample was 3.48 (SD = 1.09), and the average of risk-taking tendency was 3.12 (SD = 0.92). While the current dataset revealed some interesting interactions, the low variation in risk-taking tendency and betting experience of the sample might limit the ability to detect significant differences or interactions in the analyses. Future research can consider employing varied sampling and actively recruiting new and non-bettors to increase diversity in personal characteristics and further identify the interaction between promotional offers and customers' risk-taking tendency or betting experience.

In addition, participants did not risk their own money in the experiment, and the results might not accurately reflect participants' real responses and decisions. Future studies can consider using different methodologies such as observational studies and surveys to further understand decision making under the effect of gambling promotional offers and bettors'

individual differences. For example, researchers can recruit a group of sport bettors and ask them to report their bets and utilization of promotional offers over a specified period. In addition, in the current model, temporal aspect was not considered. Although I intentionally recruited participants first and had a short data collection window (i.e., two days) to reduce the impact of different levels of information about the game outcome, the time and date when participants completed the betting task could influence their betting decisions. For example, participants who placed bets two hours before the game may have different information compared to those who placed bets two days ahead. In the current study, the betting line remained steady during the data collection period, and participants were randomly assigned to one of the three conditions at different time points. The information about the game outcome may not have a significant change or importantly affect the comparison of risk-taking levels between the three conditions and among participants who have different characteristics.

Another limitation of this study is that sport bettors' risk-taking tendency and betting experience had a weak positive correlation, and the current two-moderator model does not discuss the interaction effect between risk-taking tendency and betting experience. Higher- risk takers may be more likely to participate in gambling. Individuals who have participated in sport betting for a longer time and bet more frequently might have more betting experience as well as a higher level of risk-taking tendency. Would they still place riskier bets and wager more money than low- risk takers when they receive profit boost tokens? Also, would low- risk takers with less betting experience wager more money on the game with profit boost tokens? The interaction between risk-taking tendency and betting experience can be further discussed and examined in future studies.

Lastly, this study only tested two promotional offers and used alternative spread of an NBA game in the betting task. In real sport betting, customers have more promotional offer options and may prefer other bets such as Moneyline bets, prop bets, and same-game parlay bets. Customers do not necessarily choose to bet on alternative spread. Future studies can use different sports and bets in the experiment to investigate gambling promotional offers and further examine other promotional offers such as bonus bets. Another interesting direction for future research that provides a real gambling scenario with real payouts is to consider a follow-up study after the game concludes and investigate how participants perceive their win or loss and how betting outcomes affect their desire to look for and use betting promotions in the future and future intent in sport betting. Such studies can explore if betting promotions can continually engage customers in sport betting and provide important practical implications for sportsbooks aiming to retain customers.

Chapter 4 The Mediating Role of Emotion in Sports Betting Decision Making (Study 3)

4.1 Introduction

Study 3 replicates and extends Study 2 by examining the mediating role of emotion in the relationship between promotional offers (i.e., profit boost and risk-free bets) and sport betting decision making. Risk-taking is arousing (Slovic, 1964; Zaleskiewicz, 2001), and gambling is emotionally involving activities (Bran & Vaidis, 2019). Emotional states during the decision-making process may play an important role when sport bettors place bets. Previous research also suggests that emotion mediates the effect of framed information on judgment and behavior (Rothman & Salovey, 1997). Thus, emotional states during decision making may be an underlying mechanism of gambling promotional offers changing betting decisions and risk-taking levels when customers place a bet. Additionally, sport betting promotions and gambling can induce both positive and negative emotions. For instance, sport bettors are likely to feel excited when they place bets or see gambling promotions (e.g., Dwyer & Lecrom, 2013; Lamont et al., 2016). They may also feel anxious and nervous about the outcomes and losing money (e.g., Dwyer & Weiner, 2018; Lopez-Gonzalez et al., 2018b). Specific emotional experiences have distinct influences on decision making (Mano, 1994), and positive and negative emotional states can lead to distinct pathways to risk-taking in sport bettors (Blaszczynski & Nower, 2002).

Therefore, the goal of Study 3 is to investigate the mediating roles of positive emotion (i.e., joviality) and negative emotion (i.e., fear) in betting decision making under the effect of promotional offers. Furthermore, risk-taking tendency is related to preferences for gambling

tasks (Zaleskiewicz, 2001) and has a significant effect on emotional responses and attitudes towards high-risk activities (Bakalova & Panchelieva, 2023; Lim et al., 2010). Sport bettors with higher levels of risk-taking tendency may experience more joviality and less fear during decision making in response to gambling promotional offers. Study 3 focuses on risk-taking tendency and examines if risk-taking tendency moderates the indirect effect of promotional offers on risk-taking through emotional states.

Although previous studies have identified the important role of emotion in gambling and reactions to sport betting promotions, the precise role of emotion in decision making under sport betting promotions is not fully tested. At the same time, the sport betting literature has focused on positive emotions such as excitement that can increase betting intention and risky decisions, but few studies investigate the effect of negative emotions (e.g., fear) on bettors' risk-taking behavior when promotional offers are provided. Study 3 examines whether the interaction effect of promotional offers and bettors' risk-taking tendency on bettors' risk-taking levels when placing a bet is transmitted through emotional states (i.e., joviality and fear) during the decision-making process. The same as Study 2, participants' risk-taking level when placing a bet was represented by the choice of alternative spread, the willingness to place the bet, and the betting amount on the game. The results did not support the proposed mediated moderation model. However, the findings revealed that both joviality and fear during decision making influenced participants' betting intention and behavior and highlighted the role of fear in the effectiveness of gambling promotions. In the current study, fear during decision making explained the effect of profit boost tokens on participants' willingness to bet. The study provided insight on the distinct and important influences of positive and negative emotions in sport betting.

In addition, this study contributes to sport betting literature by demonstrating that sport betting promotions can increase betting intention through reducing fear during decision making. Negative emotions such as fear have an important relationship with betting involvement. The study also contributes to sport marketing literature by pointing out the importance of adopting marketing techniques and creating gambling environment that enhance positive emotional experiences such as excitement and enthusiasm during decision making, which can subsequently lead to greater attention (Vast et al., 2010) and betting expenditure. In contrast, negative emotions such as fear and anxiety can facilitate risk avoidance and reduce betting intention (Anderson, 2005; Marcus et al., 2005), and decreasing fear in the betting process should be an important element in gambling marketing to boost participation.

The findings of the study provide important practical implications. Sportsbook operators should take into account both joviality and fear in their marketing strategies and betting experience. Joviality is one of the most important positive emotions in sport betting and risk-taking, and sportsbooks can consider how to keep customers excited, interested, as well as enthusiastic in the betting process to retain customers. To attract customers and increase betting intention, decreasing fear in sport betting is another strategy for sportsbooks. The results shed light on the role of sport bettors' emotions in effective marketing strategies. On the other hand, the results inform gambling regulation authorities and related organizations of the nature of emotion associated with betting and the role of emotion in gambling marketing that can significantly affect betting behavior and decision making. Understanding the underlying mechanism of risky betting decisions is important to tackle problem gambling. Reduced fear during decision making may explain the riskier and excessive gambling under the promotional settings. Recently, the American Gambling Association regulated languages used such as "risk

free" in sport betting promotions to avoid false perceptions of risk. The findings also suggest regulation and policy to supervise the advertising of gambling promotions and the placement of important terms and conditions associated with the offers that can alert potential risk and fear of losing money (Hing et al., 2019a).

4.2 Literature Review

4.2.1 Emotion in Risk Decision Making and Sport Betting

Decision making under risk research should not ignore the role played by emotion (Loewenstein et al., 2001). Previous research suggests that emotion at the moment of decision making plays a dominant role in risk decision making (Loewenstein et al., 2001; Weber, 2009) and significantly influences individuals' tendencies to take risk (Cheung & Mikels, 2011; Druckman & McDermott, 2008). Emotional responses to risky situations and framed information affect risk perceptions of choice options (Weber, 2009), influence perceived confidence and judgment (Druckman & McDermott, 2008), and guide decision making (Zajonc, 1980). Additionally, emotion can be more influential and decisive than cognitive processing and evaluations (Zajonc, 1980). People may know their decision is irrational, but they would find an emotionally satisfying explanation, make the decision that they feel right (Armstrong et al., 2020; Kirkpatrick & Epstein, 1992), and believe they have a better chance (Denes-Raj & Epstein, 1994; Denes-Raj et al., 1995). Therefore, people recognize that their decision is not rational, but they follow it nevertheless (Risen, 2016). This could be why sport bettors are more likely to choose good or boosted odds that make them feel excited without analyzing the actual outcomes and considering the potential risk (e.g., Deans et al., 2017; Killick & Griffiths, 2022b).

Gambling is an emotional activity that can exert different emotions such as excitement, thrill, enthusiasm, anxiety, and distress (e.g., Blank et al., 2021; Bran & Vaidis, 2019; Lamont &

Hing, 2018). Participation in sport betting can develop both positive and negative emotions. Gambling typically involves risk and high potential returns, and sport bettors tend to feel excited and thrilled during the game after they place bets and feel accomplished and satisfied when they prove their decisions are successful (Dwyer & Lecrom, 2013). The opportunity to win money also attracts attention and induces interest (Lamont et al., 2016). Meanwhile, risk in gambling generates negative emotional states such as anxiety (Broman-Fulks et al., 2014; Dwyer & LeCrom, 2013; Dwyer & Weiner, 2018; Gee et al., 2005; Morasco et al., 2007; Turner et al., 2007). Some gamblers feel anxious and scared when they participate in sport betting (Ofosu & Kotey, 2019). Not surprisingly, most participants feel nervous when they gamble (Lopez-del-Hoyo et al., 2022; Turner et al., 2007). They are usually nervous about the results of the game on which they place bets and scared of losing money (Lopez-Gonzalez et al., 2018b). In response to gambling promotions, some sport bettors express fear and worry about the potentially harmful effects of gambling promotions and risks (Lamont et al., 2016).

Positive emotion and negative emotion exert opposite effects on risk assessment and risk-taking behavior (Johnson & Tversky, 1983). Positive emotion decreases the judged frequency of risks, increases optimism about risk assessment and future outcomes (Johnson & Tversky,1983), and reduces loss aversion (Cassotti et al., 2012), leading to preferences for risky uncertain options (Bartholomeyczik et al., 2022). When it comes to decisions involving money, positive emotions such as enthusiasm increase perceived confidence and intensify risk-taking (Druckman & McDermott, 2008). In contrast, negative emotion increases negative evaluation and avoidance of risk (Lauriola & Weller, 2018; Slovic et al., 2005). Negative emotions such as anxiety and nervousness reduce confidence about future outcomes and lower risk-taking (Druckman & McDermott, 2008). Anxiety as one of the negative emotions signals danger and novelty, triggers

attention to threatening stimuli, and alerts people to "stop, think, and adjust behavior" (Marcus et al., 2005, p.950). When people are anxious or distressed, they tend to protect themselves from further harm or loss and choose to be risk averse when they make decisions under risk (Mano, 1994). Fear also decreases preferences for risky and uncertain options (Marcus et al., 2005). Thus, increases in positive emotion boost the likelihood of risk seeking, and increases in negative emotion are expected to reduce risk behaviors (Boyer, 2006).

In gambling, positive and negative emotions can significantly impact betting behavior and decisions (e.g., Mano, 1992). For example, previous studies found that higher positive emotional states lead to higher willingness to pay for lotteries (Mano, 1992, 1994). Excitement is one of the most important emotions that motivate individuals to participate in sport betting (Killick & Griffiths, 2021; Lamont & Hing, 2018). Excitement and enjoyment positively impact sport betting intention, engagement, and frequency (Dwyer & Lecrom, 2013; Rodriguez et al., 2015; Xu et al., 2021). Negative emotions such as anxiety are also related to gambling behavior (Blaszczynski & Nower, 2002; Browne, 1989; Dickerson, 1993) and gambling related cognition (Raylu & Oei, 2004). Previous research found that negative emotions such as depression and frustration can contribute to impaired control and problem gambling (e.g., Dickerson, 1993; Gee et al., 2005). Negative emotion during sport betting also decreases fan engagement (Blank et al., 2021). Since negative emotion facilitates risk avoidance (e.g., Marcus et al., 2005), sport bettors who experience negative emotion during decision making may be less likely to place riskier bets or wager more money. To date, little is known about the effect of emotional states during decision making on sport bettors' choices of bets when gambling promotional offers are provided. Previous studies have focused more on positive emotions induced by gambling promotions, such as excitement, that can increase betting intention and drive impulsive bets.

Negative emotional states are ignored in sport betting promotion studies, which has been shown to be important during the betting process and can be influential in the use of sport betting promotions. Therefore, Study 3 examines the effect of promotional offers on both positive and negative emotions and investigates how risk-free bets and profit boost tokens impact bettors' risk-taking levels when they place a bet through increasing or decreasing these emotions.

4.2.2 Emotional Responses to Sport Betting Promotions

Sport betting products and promotions have a number of emotional appeals (Deans et al., 2016), and audiences may be attracted to betting advertising because of the emotions it produces (Binde, 2007; David et al., 2019). Lamont et al. (2016) investigated affective responses to gambling promotions during televised sport and found that betting promotions can induce both positive and negative emotional responses. The authors discovered positive emotions including arousal, excitement, and joy. For example, promotions with betting odds updates or emphasis on "good value" betting odds generate arousal and interest in placing impulsive bets. In addition, promotions pointing out significant line movement evoke feelings of excitement that could trigger impulsive bets. Promotions also enhance audiences' intention to place spontaneous bets by using tempting potential rewards and attracting their attention. Audiences may emphasize positive emotions in gambling promotions and link them to the likelihood of winning money (David et al., 2019). On the other hand, sport betting promotions also develop negative affect such as worry and fear when customers detect the potential financial and social harm from gambling promotions and participation. Some people show anger toward gambling promotions because they notice the pressure tactics used in some promotions that stimulate interest in sport betting and elicit the urge to bet (Lamont et al., 2016).

Emotional responses to gambling promotions vary across different types of gambling promotion, and emotion differs according to the way promotional messages are delivered, the context of message delivery, and message framing (Lamont et al., 2016). Emotional reactions could also be affected by anticipated outcomes (Loewenstein et al., 2001). Both risk-free bets and profit boost tokens can increase excitement and enthusiasm due to financial incentives and the opportunity to win more money. However, these two promotions frame gambling outcomes differently, and they could generate different levels of positive and negative emotional responses during decision making in sport betting. A study found that more attention was generally paid to reduced risk than better odds offer (Lole et al., 2020). Reduced risk advertisements elicit the highest skin conductance level among different types of gambling promotions and are more desirable than better odds (Lole et al., 2020). Risk-free bets can give sport bettors security in risking their money and decrease bettors' nervousness and scare since the promotional offer provides a second chance or money back. Thus, sport bettors may experience less negative emotions such as fear and anxiety during decision making if they have risk-free bets. In contrast, profit boost tokens increase financial rewards that attract interest and increase excitement (Lamont et al., 2016). The anticipated higher winnings can make sport bettors more enthusiastic when they place a bet. However, profit boost tokens may not decrease bettors' anxiety and nervousness like risk-free bets do, as the promotion offer does not provide security for gambling. Sport bettors only have one chance to use the offer to win potential higher payouts. Thus, compared to risk-free bets, profit boost tokens may elicit more positive emotions (e.g., joviality) when sport bettors place bets but would not alleviate negative emotions such as fear.

Therefore, Study 3 examines the effect of risk-free bets and profit boost tokens on positive and negative emotional states during decision making. Druckman and McDermott

(2008) suggest that emotions need to be classified beyond positive and negative valence in risk-taking studies. For example, anger and fear are both negative emotions. However, anger leads to more risk seeking, while fear or distress leads to less risk seeking (Druckman & McDermott, 2008). The Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clark, 1994) has also reflected that two broad valences have distinguishable specific emotions, which can provide a more comprehensive emotional assessment. In sports betting, excitement and enthusiasm are two of the most discussed positive emotions (e.g., Lamont et al., 2016; Lamont & Hing, 2018; Rodriguez et al., 2015; Xu et al., 2021). Research also found better betting odds and gambling promotions generate interest and attract attention. These positive discrete emotions are mainly related to the *joviality* subscale in the PANAS-X. For negative emotions, fear and anxiety are two of the main negative emotional states during the gambling process (e.g., Broman-Fulks et al., 2014; Dwyer & Weiner, 2018; Gee et al., 2005). The *fear* subscale of the PANAS-X contains items that are closely related to the definition of anxiety and perceived stress (e.g., Rossi & Pourtois, 2012). Thus, in this study, I investigated two specific positive and negative emotions: *joviality* and *fear*. Study 3 tested the following hypotheses:

H1: Both risk-free bets and profit boost tokens will significantly increase joviality during the decision-making process when participants place a bet.

H2: Compared to profit boost tokens and no promotion, risk-free bets decrease fear during the decision-making process when participants place a bet.

H3: Compared to risk-free bets, profit boost tokens increase more joviality during the decision-making process when participants place a bet.

H4: Joviality increases risk-taking levels when participants place a bet.

H5: Fear decreases risk-taking levels when participants place a bet.

4.2.3 The Moderating Role of Risk-Taking Tendency

Risk-taking tendency is related to arousal seeking (Meertens & Lion, 2008; Zaleskiewicz, 2001). Sport bettors with a higher risk-taking tendency are usually sensation seekers (Nicholson et al., 2005). At the same time, research found that high sensation-seeking participants are significantly more risk seeking (Breslin et al., 1999; Zuckerman, 1979). One previous study found that high risk-taking tendencies induce more arousal and pleasure toward a sport that involves dangers and risks (Lim et al., 2010). Thus, risk-taking tendency could have a significant effect on emotional states when people engage in risk activities and when they are exposed to gambling promotions. Study 3 examines the interaction effect of promotional offers and risk-taking tendency on emotional states during decision making in sport betting. In a positive frame, people with a lower risk-taking tendency preferred to avoid risks, and people with a higher risk-taking tendency preferred to take risks (Gang, 2014). Profit boost tokens positively frame the betting decision problem and emphasize financial gains, and sport bettors with a higher risk-taking tendency may be more likely to be positively aroused by the offer. At the same time, to win higher potential payouts, higher- risk takers may perceive risks as more appealing and exciting (Knowles, 1976; Sitkin & Weingart, 1995) and feel less nervous when making risky decisions. Therefore, profit boost tokens may induce more joviality and less fear in individuals with a higher risk-taking tendency.

As discussed in Chapter 3, risk avoiders are more sensitive to risk and have a low tendency to take risk (Sitkin & Weingart, 1995). Risk-free bets frame the betting decision problem as “no risk” and emphasize gains of a second chance or money back. Meanwhile, risk-free bets do not provide higher profits. Therefore, risk-free bets and the “no risk” framing may be influential for sport bettors with a lower risk-taking tendency and significantly impact their

emotional states during decision making. Under the "no risk" framing, lower- risk takers are more likely to be aroused and exhibit higher joviality and less fear compared to receiving profit boost tokens or no promotion.

Thus, Study 3 tested the following hypotheses:

H6: Individual's risk-taking tendency moderates the effect of promotional offer on their levels of joviality and fear.

H6a: When sport bettors receive profit boost tokens, sport bettors with a higher risk-taking tendency will report a higher level of joviality and lower level of fear than those with a lower risk-taking tendency.

H6b: When sport bettors receive risk-free bets, there will be no significant difference in joviality or fear reported between low- and high- risk takers.

In addition, Study 3 tested the following hypotheses (H7-H9) proposed in Study 2 by using a new dataset and a new payout structure.

H7: Promotional offers increase sport bettors' risk-taking when they place a bet.

H8: Compared to profit boost tokens, risk-free bets increase more risk-taking when sport bettors place a bet.

H9: Promotional offers have an interaction effect with individuals' risk-taking tendency on sport bettors' risk-taking levels when they place a bet.

4.2.4 The Mediating Role of Emotion in Gambling

In the current study, I propose that emotion mediates the effect of promotional offers on bettors' risk-taking levels when they place a bet. Some researchers argue that framing effect stems from affective processing and affective heuristic (Cassotti et al., 2012; Slovic et al., 2005). It is possible that the prospect's frame changes decision makers' emotional state, which leads to

a shift in risk perceptions and guide decision making (Mano, 1992, 1994; Zajonc, 1980). Emotion can serve as the underlying mechanism of framing effect and provide a more comprehensive understanding of how marketing frames affect decision making in gambling (Bueno de Mesquita & McDermott, 2004). In sport betting, betting products manipulate an individual's emotion to enhance winning expectancy and promote excessive time and money on gambling (Browne et al., 2016; Wardle et al., 2019). For example, participants who engage in live betting enjoy increased excitement and need to make quick decisions when they are in emotionally charged situations (Killick & Griffiths, 2021). The enhanced emotionality during the game can increase betting expenditure and facilitate biased decision making. Moreover, sport betting advertising and promotional offers enhance bettors' intention and desire to bet through increasing bettors' arousal (Lole et al., 2020). Bettors who have a favorable disposition to sports betting promotion are more likely to be influenced by these promotions, display greater intention to bet, and worsen their problem sports betting behavior (Hing et al., 2015a, 2015b). Thus, emotional state during decision making in sport betting may mediate the effect of promotional offer framing on betting decisions (Rothman & Salovey, 1997).

A growing literature has investigated the mediating role of emotion in betting promotions and advertising. For example, De Jans (2022) found that betting advertising that included betting odds led to more positive emotional reactions such as excitement, which subsequently generated higher betting intention and positive betting attitudes. Emotion explains the effect of odds advertising on feelings and intention towards sports betting. Xu et al. (2021) found that live on-screen betting odds during XFL game broadcasts increase perceived enjoyment, excitement expectancy, and betting intention. The authors suggest that to achieve higher levels of betting intention, betting companies could implement marketing strategies that focus on enhancing

perceived enjoyment and increasing excitement when customers view sports betting promotions. Therefore, the effect of promotional offers on risk-taking levels when participants place a bet may be transmitted through emotional states during decision making.

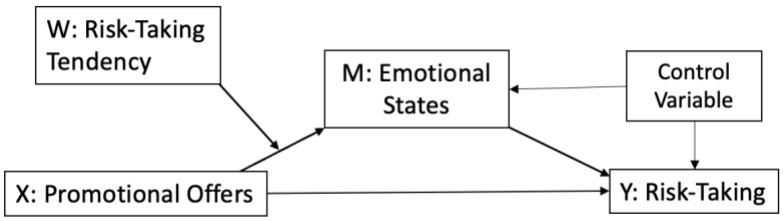
H10: The interaction effect of promotional offers and risk-taking tendency on sport bettors' risk-taking levels when they place a bet is transmitted through emotional states during decision making.

4.2.5 The Mediated Moderation Model of Study 3

The mediated moderated model below (Figure 4.1) specifies a causal mechanism among the variables in Study 3. The relationship between promotional offers and emotional states is moderated by risk-taking tendency, and the effect of promotional offers and risk-taking tendency on sport bettors' risk-taking is transmitted through emotional states during decision making, which functions as a mediator. The analytical procedures of testing the mediated moderated model will be further discussed in the Methodology section.

Figure 4.1

The Mediated Moderation Model in the Form of a Conceptual Model Adapted from Hayes (2015)



Note. X is the independent variable. Y is the dependent variable. M is the mediator. W is the moderator.

4.3 Methodology

4.3.1 Study Design and Stimuli

To replicate Study 2 and examine the mediating role of emotion, I employed a similar experimental design as Study 2 and used a regular season NBA game as stimuli. To further examine the mediating role of emotion, Study 3 measured participants' emotional states at the start of the experiment and during the decision-making process when they placed a bet. The experiment was conducted online using Qualtrics, and participants received payouts if their bets settled as a win. Winnings were paid to participants through "Bonus Payment" on Prolific. As seen in Table 4.1, one regular season NBA game (Los Angeles Clippers vs. Minnesota Timberwolves) in January 2024 was used and a 10-point alternative spread for the game was provided in the betting task. Participants were instructed to bet on the alternative spread of the basketball game (see Appendix C).

Table 4.1

10-point Alternative Spread for the Betting Task

	Alternative Spread	Corresponding Betting Odds
1	Minnesota Timberwolves -5.5	+200
2	Minnesota Timberwolves -4.5	+175
3	Minnesota Timberwolves -3.5	+154
4	Minnesota Timberwolves -2.5	+135
5	Minnesota Timberwolves -1.5	+114
6	Minnesota Timberwolves +1.5	-110
7	Minnesota Timberwolves +2.5	-125
8	Minnesota Timberwolves +3.5	-145
9	Minnesota Timberwolves +4.5	-166
10	Minnesota Timberwolves +5.5	-195

The same as in Study 2, Study 3 measured participants' choice of alternative spread, willingness to place the bet, and betting amount on the game as indicators of participants' risk-

taking levels when they place a bet on the NBA game. The experiment used a 3-level between-subjects design and had three experimental conditions: control condition, profit boost condition, and risk-free bets condition. In the control condition, participants were asked to bet on the 10-point alternative spread of the basketball game (see Appendix C). No promotional offer was provided in the control condition. In the profit boost condition and risk-free bets condition, participants saw the same alternative spread and the corresponding betting odds of the basketball game. In addition, in each condition, participants were provided with the promotional offer and the information about its benefit (See Appendix D). In the profit boost condition, participants received a 50% profit boost to their winnings. In the risk-free bets condition, participants received their stake back through "Bonus Payments" on Prolific if they lost their bets. Study 3 used the same promotional offers as those in Study 2.

4.3.2 Participants and Procedures

Study 3 used similar procedures to those of Study 2. Emotional states were measured in the experiment. Participants received $0.85 as compensation. After the game concluded, participants received their winnings through "Bonus Payments" on Prolific if they won their bets. To prevent learning effect and repetitive sample, only participants who passed the prescreening and did not participate in Study 2 were invited to the Study 3 online experiment through their Prolific IDs. 418 participants were invited, and 348 of them completed the online experiment during the data collection window.

After consenting to participate in the study, participants first rated their emotional states (e.g., "At this moment, to what extent do you feel excited?"), familiarity with sport betting and the NBA, team identification with the teams in the experiment, betting frequency, betting expenditure, betting experience, and betting apps used primarily (See Appendix F). Next,

participants reported their risk-taking tendency (See Appendix E). Before the betting task, participants were asked to carefully read the betting instruction (See Appendix A) and were randomly assigned into one of the three between-subject conditions. The online experiment offered $5 for participants to bet on the game. Participants can use all or part of the $5 they had to bet on the game, and they received the rest of the money and the payouts if their bet settled as a win. Participants must wager at least $0.50.

After reading the betting instruction, participants were instructed to view the 10-point alternative spread and the corresponding betting odds of the NBA game and were asked to place a single bet on the alternative spread of the game. If participants were assigned to the profit boost condition and risk-free bets condition, they also saw the promotion messages along with the betting task. Immediately after participants viewed the betting task and before they reported their bet selections, they were asked to rate their emotional states when they decided which bet selection to wager on (e.g., "During the process of deciding which alternative spread to bet on, to what extent do you feel excited?"). Next, they reported their betting selection (i.e., choice of alternative spread) and how much money they wanted to wager on the game out of the $5 they received. Participants then indicated their willingness to place the bet.

After reporting their betting decisions, participants indicated their perceived confidence and perceived risk about their wagers. At the end of the questionnaire, participants provided their demographic information (i.e., gender, age, and race), and they were informed that the alternative spread, betting odds, and promotional offers were created by DraftKings and the researcher, prepared only for research purposes. The findings of this study can help better understand how promotional offers and emotion affect risk-taking behavior in sports betting.

Same as Study 2, data collection started two days before the game and stopped prior to the start of the game. During data collection, the betting lines of the basketball remained steady. Participants received $0.85 as participation payment after they completed the study, and they received their winnings plus the amount of money they did not use through "Bonus Payment" on Prolific in three business days after the game concluded.

4.3.3 Measures

The dependent variables in this study include betting selection (i.e., choice of alternative spread), betting amount (i.e., 'How much money do you want to wager on the game out of the $5 you received'), and willingness to bet (i.e., 'What is your willingness to make the wager you just saw'). The same as Study 2, these three dependent variables were used to indicate participants' risk-taking levels when they place a bet on the given NBA game. Measures of risk-taking tendency, perceived confidence, and perceived risk were the same as in Study 2. Familiarity questions asked participants if they were familiar with sport betting, betting promotional offers, alternative spread, betting odds, betting on the NBA, the NBA, the Los Angeles Clippers, and the Minnesota Timberwolves, which were important elements in the betting task. Previous betting behavior and demographic measures were the same as in Study 2.

Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) and the expanded version of the PANAS (PANAS-X; Watson & Clark, 1991, 1994) were reviewed, adapted, and used in Study 3 to capture participants' emotional states. The PANAS was developed to capture two broad and independent factors in emotional experience: positive and negative affect (PA and NA). The PANAS-X measures 11 specific emotional states such as fear and joviality. Both scales are proved to be reliable, valid, and efficient means for measuring positive and negative mood. They are easy to administer and use in different scenarios. Since not all the emotion

measures in the PANAS and PANAS-X are applicable in reactions to gambling promotions, I selected sport betting promotion-related emotions and gambling-related emotions from the scales based on current sport betting and gambling literature (e.g., Dwyer & LeCrom, 2013; Dwyer & Weiner, 2018; Lamont et al., 2016). I selected *excited*, *interested*, *enthusiastic*, and *attentive* from the previous gambling studies, which were primarily categorized as *Joviality* based on the PANAS-X. Thus, the positive emotion measured and tested in this study was *Joviality*. According to previous studies, the critical negative emotions related to gambling decision making are *scared, nervous, and jittery,* which were categorized as *Fear* in the PANAS-X. Turner et al. (2017) categorize *nervous* and *scared* into anxiety, which is another main negative emotion in gambling and is related to fear (Rossi & Pourtois, 2012). Some studies focus on *distress* to capture anxiety (Druckman & McDermott, 2008; Marcus et al., 2005, p. 962). Thus, the negative emotion measured and tested in this study was *Fear*, and I used *scared*, *nervous*, *jittery,* and *distressed* to measure *Fear* (See Appendix E). Factor analysis was first used to test if these eight discrete emotions were grouped into two factors as expected. The multiple items were then averaged to designate a composite variable for *Joviality* and *Fear* during the decision-making process when sport bettors place the bet.

In Study 3, I aimed to capture the emotional states during the decision-making process. Therefore, I measured participants' emotions after participants viewed the stimuli and before they reported their betting selection (e.g., "During the process of deciding which alternative spread to bet on, to what extent do you feel excited?"). In this way, I can measure participants' emotional states after they were exposed to the stimuli, which was the source of emotion, and I can avoid capturing participants' emotion after they made the decision or how they felt about their choices. To prevent the influence of participants' initial emotion on the results, participants'

emotional states at the beginning of the study were also measured and used as a baseline emotion (e.g., "At this moment, to what extent do you feel excited?"). The same instruments were used for the eight discrete emotions selected in this study, and the measures of emotional states during the decision-making process are detailed in Appendix E.

4.3.4 Data Analysis

With a new dataset in Study 3, I first tested H7, H8, and H9, which were proposed in Study 2. I used the same data analysis procedure as in Study 2 to test the hypotheses and investigate if Study 3 replicated the results of Study 2 by using a different payout structure and a different game.

To test H1 – H5 in Study 3, I ran a series of linear regressions to examine the relationships between promotional offers and emotional states during decision making and the relationships between emotional states during decision making and risk-taking. Dummy coding was used to convert promotional offers into two dummy variables for profit boost and risk-free bets, with the control condition serving as the reference group. In these linear regressions, the initial emotional states at the start of the study, previous betting behavior, and demographics were analyzed as control variables.

To test H6 and H10, I tested a mediated moderation model (Figure 4.1) to investigate if the indirect effect of promotional offers (X) on risk-taking (Y) through emotional states during decision making (M) is contingent on risk-taking tendency (W). Dummy coding was used to convert the manipulated independent variable into two dummy variables for profit boost (X1) and risk-free bets (X2), with the control condition serving as the reference group. Participants' initial emotional states was included as one of the control variables in the analysis, which could

potentially mitigate the influence of participants'' initial emotional states when they participated in the experiment.

Mediation is to test when the relationship between an independent variable and a dependent variable can be explained by their relationship to a third variable (mediator). A mediator is conceptualized as the mechanism through which independent variable influences dependent variable. In a simple mediation model, as seen in (1), (2), and (3), *c* estimates the total effect of the independent variable (IV) on the dependent variable (DV), without considering the potential influence of the mediator variable. *c'* estimates the direct effect of the independent variable on the dependent variable, which is a direct relationship between the independent variable and the dependent variable, controlled for the mediator variable. The indirect effect of the independent variable on the dependent variable is the relationship of the independent variable and the dependent variable via the mediator and is the measure of the amount of mediation. A mediator reduces the size of the relationship between the independent variable and the dependent variable. The indirect effect (*ab*) is estimated by taking the difference in the total effect and the direct effect, $c - c'$ (Alwin & Hauser, 1975; MacKinnon & Dwyer, 1993). If the indirect effect is significant, and the relationship between the independent variable and dependent variable becomes nonsignificant after controlling for the mediator in the model, the mediator fully explains the relationship between the independent variable and the dependent variable. e_1, e_2 and e_3 are errors in the estimation of the mediator and the independent variable.

$$\text{DV} = i_1 + c\text{IV} + e_1 \quad (1)$$

$$\text{DV} = i_2 + c'\text{IV} + b\text{Mediator} + e_2 \quad (2)$$

$$\text{Mediator} = i_1 + a\text{IV} + e_3 \quad (3)$$

In the proposed mediated moderation model (Figure 4.2 and Figure 4.3), the interaction between promotional offers (X) and risk-taking tendency (W) on participants' risk-taking (Y) is carried through emotional states during decision making (M; Baron & Kenny, 1986; Hayes, 2013; Muller et al., 2005). To test the mediated moderation model with a multi-categorical independent variable, I followed the instructions and analytical procedure by Hayes (2015, 2018), Hayes and Preacher (2014), and Muller et al. (2005). To demonstrate mediated moderation, an overall moderation between promotional offers (X) and risk-taking (Y) must occur first. Thus, the model first tests if there was an overall moderation between promotional offers (X) and risk-taking (Y), in which the moderator variable is risk-taking tendency (W). Equation (4) and (5) assess the overall moderation. c_1 estimates the total effect of profit boost (X1) on risk-taking (Y), and c_4 estimates the total effect of risk-free bets (X2) on risk-taking (Y). c_3 estimates the total interaction effect of profit boost (X1) and risk-taking tendency (W) on risk-taking (Y), and c_6 estimates the total interaction effect of risk-free bets (X2) and risk-taking tendency (W) on risk-taking (Y). If c_3 and c_6 are statistically significant, the effect of promotional offers (X) on risk-taking (Y) depends on risk-taking tendency (W). Control variables (cov) were included in the regression models.

$$Y = i_1 + c_1X1 + c_2W + c_3X1*W + \gamma cov + e_4 \quad (4)$$

$$Y = i_1 + c_4X2 + c_5W + c_6X2*W + \gamma cov + e_5 \quad (5)$$

Next, a moderation between promotional offers (X) and emotional states during decision making (M) must occur, and there must be an effect of emotional states during decision making (M) on risk-taking (Y) when promotional offers (X) are controlled. Finally, the moderation of the direct effect must be reduced compared to the moderation of the total effect. Equation (6) and (7) assess the effects on the mediator. a_3 estimates the interaction effect of profit boost (X1) and

risk-taking tendency (W) on emotional states during decision making (M). a_6 *estimate* the interaction effect of risk-free bets (X2) and risk-taking tendency (W) on emotional states during decision making (M). If a_3 and a_6 are statistically significant, the effect of promotional offers (X) on emotional states during decision making (M) depends on risk-taking tendency (W). Lastly, the model tests whether the interaction between promotional offer (X) and risk-taking tendency (W) in determining risk-taking (Y) is mediated by emotional states during decision making (M). As seen in (8) and (9), c'_3 estimates the direct interaction effect of profit boost (X1) and risk-taking tendency (W) on risk-taking (Y), and c'_6 estimates the direct interaction effect of risk-free bets (X2) and risk-taking tendency (W) on risk-taking (Y). The indirect effect of profit boost (X1) and risk-taking tendency (W) on risk-taking (Y) through emotional states during decision making (M) is c_3-c'_3. The indirect effect of risk-free bets (X2) and risk-taking tendency (W) on risk-taking (Y) through emotional states during decision making (M) is c_6-c'_6. Control variables (cov) were included in the regression models.

$$M = i_2 + a_1X1 + a_2W + a_3X1*W + \gamma cov + e_6 \quad (6)$$

$$M = i_2 + a_4X2 + a_5W + a_6X2*W + \gamma cov + e_7 \quad (7)$$

$$Y = i_3 + c'_1X1 + c'_2W + c'_3X1*W + bM + \gamma cov + e_8 \quad (8)$$

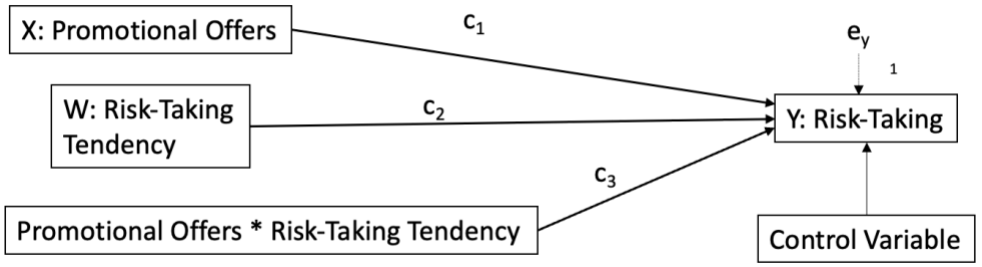
$$Y = i_3 + c'_4X2 + c'_5W + c'_6X2*W + bM + \gamma cov + e_9 \quad (9)$$

To establish the mediated moderation model, c_3 and c_6 should be significant. Next, both a_3, a_6, and b should be significant. Lastly, c'3 and c'6 should be reduced in magnitude compare to c_3 and c_6. If there was no overall moderation between promotional offer (X) and risk-taking (Y), the model would be a moderated mediation model (Muller et al., 2005), in which only the effect of promotional offer (X) on emotional states during decision making (M) depended on risk-taking tendency (W). I used "model=8" to instruct PROCESS to conduct a moderated

mediation analysis and determine if mediation is present and if the moderator influences the indirect effect. Control variables considered in the regression model included participants' initial emotional states, previous betting behavior, and demographics. The mediated moderation model was tested twice for two mediators, *Joviality* and *Fear*.

Figure 4.2

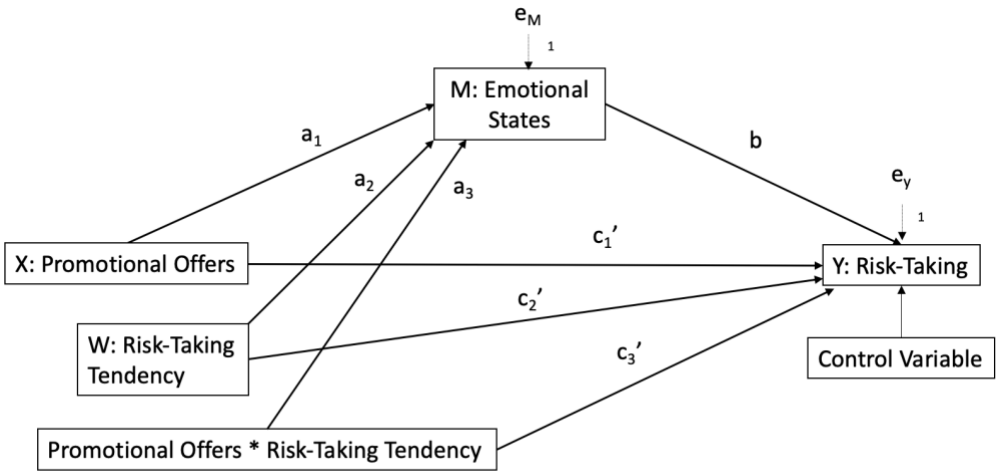
The Mediated Moderated Model in the Form of a Statistical Model Adapted from Hayes (2013) – Overall Moderation



Note. Overall moderation between promotional offers (X) and risk-taking (Y)

Figure 4.3

The Mediated Moderated Model in the Form of a Statistical Model with the Model of the Effect of XW as well as the Mediation of XW's Effect by M Adapted from Hayes (2013)



4.4 Results

In Study 3 (N = 348), the majority of the participants were male (81.90%) and Caucasian (71.84%). The average age was 40.10 (*SD* = 11.57). Participants were familiar with sport betting (*M* = 4.55, *SD* = 0.57) and the NBA (*M* = 4.54, *SD* = 0.66). A five-point Likert scale was used to measure participants' familiarity. All the participants reported they have used at least one online betting product or placed bets at local casinos. The sample in this study was average risk-takers (*M* = 3.02, *SD* = 0.95). Thirty-four percent of participants indicated that they bet on NBA games once a week or more, and twenty percent indicated that they bet on NBA games once a season. More than half of the participants (67.82%) indicated that they usually bet $6 - $50 on one sport bet. Team identification with the Los Angeles Clippers (*M* = 2.10, *SD* = 1.18) and the Minnesota Timberwolves (*M* = 2.05, *SD* = 1.13) were low.

Exploratory factor analysis (EFA) and CFA were used to identify the latent variables in the study and confirm the validity and reliability of the measurement model. The familiarity questions were grouped into two latent variables: (1) familiarity with sport betting and (2) familiarity with the NBA. In the risk-taking tendency measures, "I really dislike not knowing what is going to happen" was removed due to low loading (0.52). In the emotional states measures, *jittery* and *interested* were removed due to low loadings. *Joviality* consisted of *excited*, *enthusiastic*, and *attentive*. *Fear* consisted of *nervous*, *scared*, and *distressed*. As shown in Table 4.2, the measurement model showed good reliability and validity.

Table 4.2

Constructs in the Measurement Model

Construct	Cronbach Alpha	AVE	omega
Risk-taking Tendency	0.88	0.61	0.89
Initial Emotional States (Joviality)	0.81	0.66	0.84
Initial Emotional States (Fear)	0.83	0.63	0.83
Joviality during Decision Making	0.80	0.67	0.84
Fear during Decision Making	0.82	0.63	0.83
Familiarity with Sport Betting	0.83	0.51	0.83
Familiarity with the NBA	0.84	0.76	0.90
Team Identification with Los Angeles Clippers	0.92	0.80	0.92
Team Identification with Minnesota Timberwolves	0.94	0.83	0.94
Acceptable Fit Indices: Chi-Square test of model fit $\chi 2 = 1169.71$ ($p < .05$), CFI = 0.90, RMSEA = 0.07, SRMR = 0.06			

Control variables added in the analysis were familiarity with sport betting, familiarity with the NBA, betting frequency, betting expenditure on one sport bet, betting experience, and demographics (i.e., gender, race, and age). In this study, the control variables were all weakly correlated with the dependent variables (i.e., betting selection, betting amount, and willingness to bet).

4.4.1 Test of Hypotheses 7-9

4.4.1.1 Dependent Variable: Betting Selection (i.e., Choice of Alternative Spread)

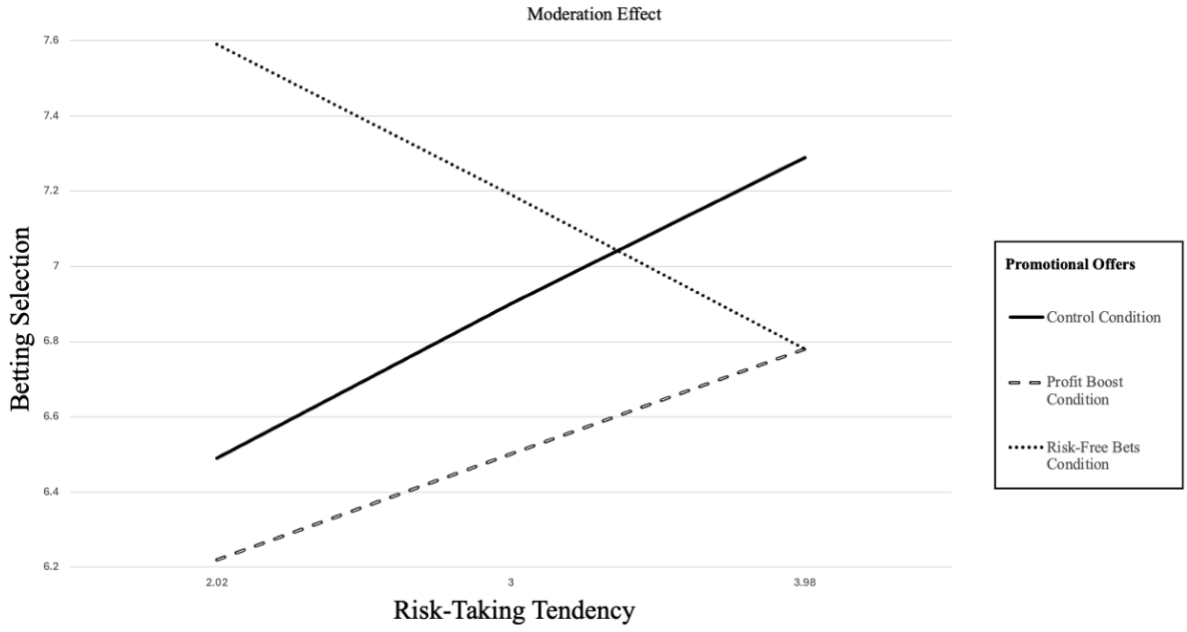
Linear regression was first conducted to identify which control variables were significantly related to betting selection (i.e., choice of alternative spread). As shown in Table 4.3, results showed that team identification with the Minnesota Timberwolves ($p = 0.01$, $b = -0.43$) was significantly related to betting selection. This variable was added as a covariate to the

moderation analysis. Risk-taking tendency was not significantly related to betting selection (p = 0.77, b = 0.05).

As shown in Table 4.4, the PROCESS macro results showed that promotional offers did not have a main effect on betting selection. Participants who received profit boost tokens placed slightly riskier bets (p = 0.32, β = 0.38), while those who received risk-free bets placed slightly less risky bets (p = 0.40, β = -0.33). Therefore, H7 and H8 are rejected when betting selection was used to represent risk-taking. The moderation analysis results indicated that there was an interaction effect between promotional offers and risk-taking tendency. The interaction effect of risk-free bets and risk-taking tendency was significant (p = 0.04, β = 0.87). Although risk-free bets did not significantly induce riskier bets, the promotion encouraged riskier bets among sport bettors who have a lower risk-taking tendency. The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation effect (Figure 4.4). In the control and profit boost conditions, participants with a higher risk-taking tendency placed riskier bets. In contrast, in the risk-free bets condition, participants with a lower risk-taking tendency placed riskier bets, while those with a higher risk-taking tendency placed less risky bets. Therefore, H9 fails to be rejected when betting selection was used to represent risk-taking levels when participants placed a bet.

Figure 4.4

Moderation Effect of Promotional Offers and Risk-Taking Tendency on Betting Selection



4.4.1.2 Dependent Variable: Betting Amount

While wager amounts provide valuable insight into bettors' risk-taking behavior, factors such as previous betting behavior and choice of alternative spread can influence betting amount on the game. For example, participants may wager more money on a safer betting option. In the current study, betting amount (i.e., the amount of money wagered on the game out of the $5 participants received) was weakly correlated with betting selection (b = 0.08) and was not significantly related to betting selection (p = 0.18, b = 0.12). Linear regression was conducted to identify which control variables were significantly related to betting amount. As shown in Table 4.3, results showed that betting expenditure on one sports bet (p = 0.002, b = 0.22), years of betting on NBA games (p = 0.03, b = -0.18), and team identification with the Minnesota

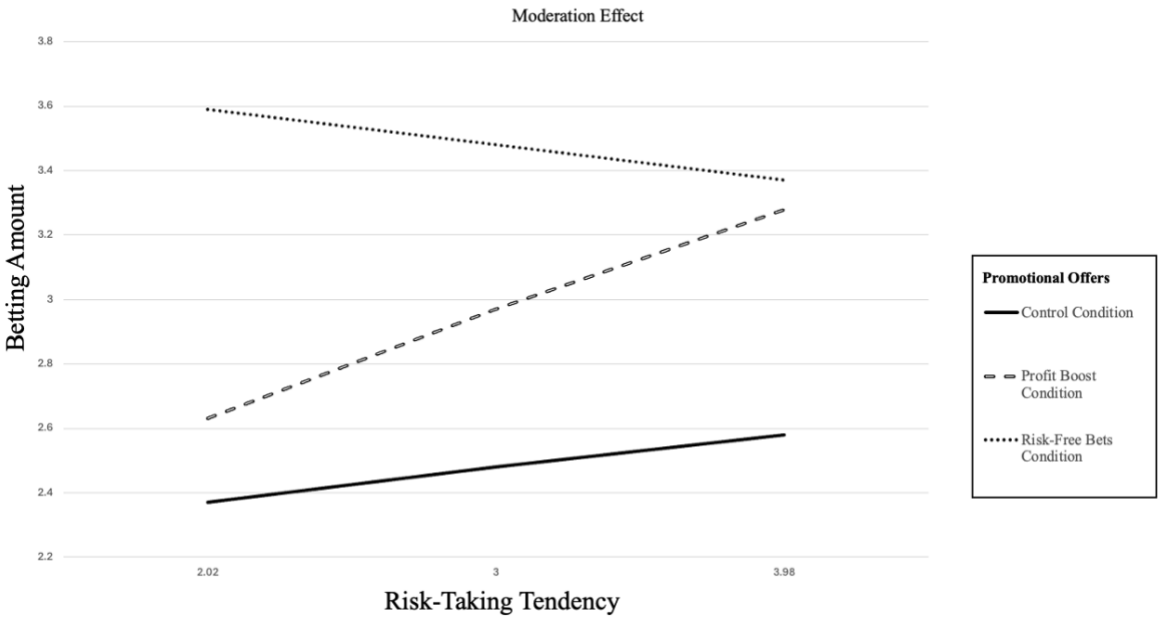
Timberwolves (p = 0.01, b = -0.24) were significantly related to betting amount. These three variables were added as covariates to the moderation analysis. In addition, risk-taking tendency increased betting amount (p = 0.09, b = 0.16).

As seen in Table 4.4, the PROCESS macro results showed that promotional offers had a significant main effect on betting amount and significantly induced participants to wager more money on the game. Compared to the control condition, participants in the profit boost condition (p = 0.02, β = 0.47) and the risk-free bets condition (p < .001, β = 1.01) wagered significantly more money on the game out of the $5 they received in the experiment. Participants in the risk-free bets condition wagered the most money. Therefore, H7 and H8 fail to be rejected when betting amount was used to represent risk-taking levels when participants placed a bet.

As seen in Table 4.4, the results indicated that there was no significant interaction effect between promotional offers and risk-taking tendency. The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation effect (Figure 4.5). A series of linear regressions to identify the effect of risk-taking tendency on betting amount were also conducted for each condition (Table 4.5). In the control condition, risk-taking tendency did not significantly increase betting amount. In the profit boost condition, participants with a higher risk-taking tendency significantly wagered more money (p = 0.03, b = 0.36). In contrast, in the risk-free bets condition, participants with a higher risk-taking tendency wagered less money (p = 0.36, b = -0.15). Different patterns were discovered in the experimental conditions, and H9 fails to be rejected when betting amount was used to represent risk-taking levels when participants placed a bet. However, the interaction effect was not statistically significant.

Figure 4.5

Moderation Effect of Promotional Offers and Risk-Taking Tendency on Betting Amount



4.4.1.3 Dependent Variable: Willingness to Bet

Linear regression was first conducted to identify which control variables were significantly related to willingness to bet (i.e., participants' willingness to place the bet). As shown in Table 4.3, results showed that team identification with the Clippers (p = 0.02, b = 3.22) and familiarity with sport betting (p = 0.01, b = 7.38) were significantly related to willingness to bet. These two variables were added as covariates to the moderation analysis. In addition, risk-taking tendency significantly increased willingness to bet (p = 0.03, b = 3.17).

As seen in Table 4.4, the PROCESS macro results showed that promotional offers significantly increased participants' willingness to bet. Compared to the control condition, participants in the profit boost condition (p = 0.02, β = 7.17) and the risk-free bets condition (p =

.01, $\beta = 8.12$) were significantly more willing to place the bet. Participants in the risk-free bets condition show the greatest willingness to place the bet. Therefore, H7 and H8 fail to be rejected when willingness to bet was used to represent risk-taking levels when participants placed a bet.

As seen in Table 4.4, the results indicated that there was no significant interaction effect between promotional offers and risk-taking tendency. The values in "Data for visualizing the conditional effect of the focal predictor" were used to visualize the moderation effect (Figure 4.6). In all conditions, participants with a higher risk-taking tendency were more willing to place the bet. H9 is rejected when willingness to bet was used to represent risk-taking levels when participants placed a bet.

Figure 4.6

Moderation Effect of Promotional Offers and Risk-taking Tendency on Willingness to Bet

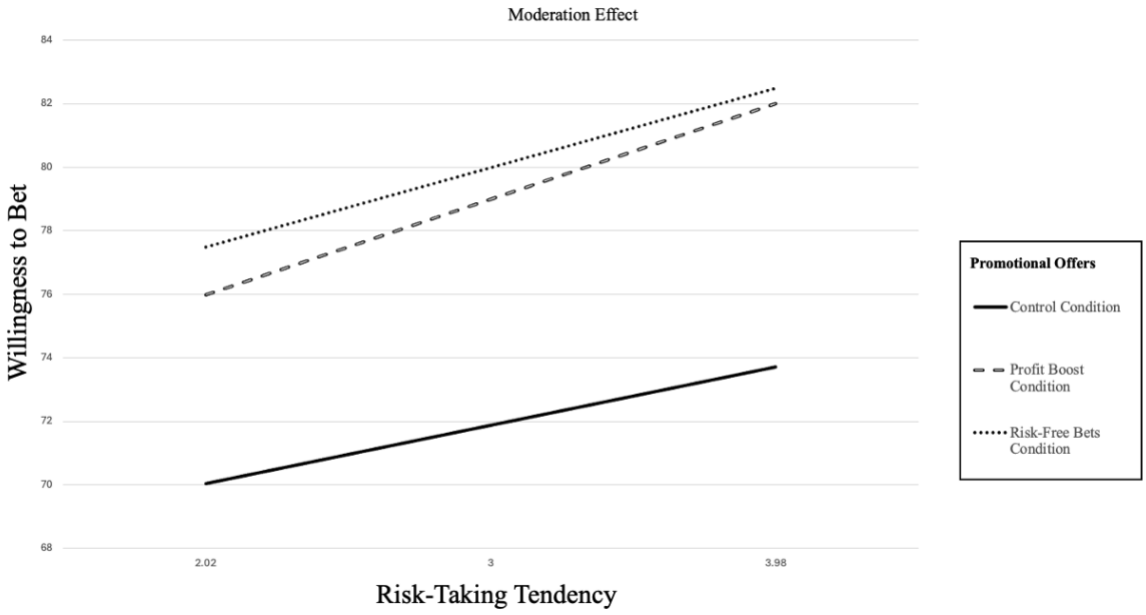


Table 4.3

Regression Analyses of the Effects of Control Variables and Moderator on the Dependent Variables

Variables	Betting Selection		Willingness to Bet		Betting Amount	
	b	*t*	*b*	*t*	*b*	*t*
Betting Expenditure on One Sports Bet	0.04	0.32	0.29	0.30	0.22**	3.11
Familiarity with the NBA	-0.47	-1.22	3.15	1.35	-0.01	-0.03
Familiarity with Sport Betting	0.26	0.90	7.38**	2.36	-0.05	-0.33
Betting Frequency	-0.14	-0.79	0.97	0.70	0.07	0.74
Team Identification with the Los Angeles Clippers	0.13	0.77	3.22**	2.32	0.11	1.17
Team Identification with the Minnesota Timberwolves	-0.43**	-2.49	-1.96	-1.40	-0.24**	-2.45
Age	0.00	0.65	0.21	1.89	0.00	0.48
Risk-Taking Tendency	0.05	0.29	3.17**	2.14	0.16*	1.61
Years of Betting on NBA games	-0.06	-0.44	-0.44	-0.39	-0.18**	-2.18
N	348		348		348	
R^2	0.00		0.08		0.06	

Note. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. Neither gender nor race had a significant relationship with betting selection. * $p < .10$. ** $p < .05$.

Table 4.4

Interaction Effects on the Dependent Variables

Variables	Betting Selection		Willingness to Bet		Betting Amount	
	β	*t*	*β*	*t*	*β*	*t*
Familiarity with Sport Betting	0.32	0.99	9.41***	3.61	-0.05	-0.35
Team Identification with the Los Angeles Clippers	-0.13	-0.75	2.68*	1.80	0.05	0.47
Years of Betting on NBA games	0.06	0.40	-0.35	-0.35	-0.11	-1.46
Betting Expenditure on One Sports Bet	-0.08	-0.70	-0.41	-0.42	0.19**	2.84
Team Identification with the Minnesota Timberwolves	0.40**	2.33	-1.76	-1.19	-0.20**	-2.06
Risk-Taking Tendency	-0.40	-1.31	1.90	0.62	0.07	0.38
Betting Experience	0.25	1.10	1.02	0.47	0.01	0.04
Profit Boost	0.38	0.99	7.17**	2.28	0.47**	2.25
Risk-free Bets	-0.33	-0.84	8.12**	2.46	1.01***	4.61
Profit Boost * Risk-Taking Tendency	0.10	0.23	1.38	0.36	0.23	0.93
Risk-Free Bets * Risk-Taking Tendency	0.87**	2.01	1.01	0.26	-0.26	-1.03
Profit Boost * Betting Experience	-0.20	-0.61	0.87	0.31	0.14	0.77
Risk-Free Bets * Betting Experience	-0.47	-1.52	-2.48	-0.90	0.12	0.65
N	348		348		348	
R^2	0.04		0.14		0.15	

Note. The control condition (no promotion) was coded as baseline. Each regression model only included control variables that were significantly related to the dependent variable. *β* indicates the standardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. ** $p < .05$. *** $p < .001$.

Table 4.5

Regression Analyses of the Effects of Risk-Taking Tendency on the Dependent Variables in Each Condition

Condition	Variables	Betting Selection		Willingness to Bet		Betting Units		N
		b	*t*	*b*	*t*	*b*	*t*	
Control Condition	Risk-taking Tendency	0.17	0.58	1.03	0.36	0.08	0.50	116
Profit Boost Condition		0.31	1.03	3.61*	1.67	0.36**	2.15	116
Risk-Free Bets Condition		-0.35	-1.26	2.53	1.18	-0.15	-0.92	116

Note. b indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. Each regression model included control variables that were significantly related to the dependent variable.

* $p < .10$. ** $p < .05$.

4.4.1.4 Multicollinearity Issues and Robustness Check

As discussed in Study 2, multicollinearity might exist in the two-moderator model. Therefore, I ran a one-moderator model that only included risk-taking tendency to detect if the significance of the interaction terms changed. The results of the one-moderator model were shown in Appendix G. The one-moderator model did not show any significant interaction effects that were not detected in the two-moderator model. Therefore, I proceeded to interpret and discuss the results from the two-moderator model.

4.4.2 Test of Hypotheses 1 - 6 and 10

4.4.2.1 Promotional Offers and Emotional States

Linear regression was conducted to examine the effect of promotional offers on emotional states during decision making. The initial emotional states were analyzed as one of the control variables. Results showed that betting experience ($p = 0.01$, $b = 0.17$), team identification with the Clippers ($p < .001$, $b = 0.14$), and familiarity with sport betting ($p = 0.01$, $b = 0.27$) were significantly related to joviality during decision making. As seen in Table 4.6, compared to no

promotion, neither of the promotional offers, profit boost tokens (p = 0.90, b = -0.01) nor risk-free bets (p = 0.38, b = 0.07), significantly increased or decreased joviality. H1 is rejected.

Linear regression results showed that familiarity with the NBA (p = 0.02, b = -0.17) was significantly related to fear during decision making. As seen in Table 4.6, compared to no promotion, profit boost tokens significantly decreased fear (p = 0.02, b = -0.15). Risk-free bets decreased fear as well (p = 0.13, b = -0.10), but this result did not reach statistical significance. Profit boost tokens appear to be more influential than risk-free bets in decreasing fear. H2 is rejected. Profit boost tokens did not increase joviality but significantly decreased fear. Therefore, H3 is rejected.

Table 4.6

Effects of Promotional Offers on Emotional States during Decision Making

Variable	*Joviality*		*Fear*	
	b	*t*	*b*	*t*
Profit Boost Tokens	-0.01	-0.12	-0.15**	-2.23
Risk-Free Bets	0.07	0.88	-0.10	-1.50
N	348		348	
R^2	0.51		0.47	

Notes. The control condition (no promotion) was coded as baseline. Initial emotional states and other control variables were included in each regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. **p < .05.

4.4.2.2 Emotional States and Risk-Taking

A series of linear regressions were conducted to examine the effect of emotional states during decision making on risk-taking (Table 4.7). First, neither joviality nor fear during decision making significantly affected betting selection. Joviality during decision making increased the betting amount on the game out of the $5 participants received (p = 0.06, b = 0.27). Fear during decision

making significantly decreased willingness to bet ($p < .001$, b = -9.81). Participants who perceived higher levels of fear during decision making were less willing to place the bet. In contrast, joviality during decision making significantly increased willingness to bet ($p < .001$, b = 7.66). Participants who perceived higher levels of joviality during decision making were more willing to place the bet. Therefore, H4 and H5 fail to be rejected. Joviality increased betting amount and willingness to bet, while fear only decreased willingness to bet.

Table 4.7

Effects of Emotional States on the Dependent Variables

Variable	Betting Selection			Willingness to Bet			Betting Amount		
	b	*t*	R^2	*b*	*t*	R^2	*b*	*t*	R^2
Joviality	0.12	0.47	0.00	7.66***	3.79	0.06	0.27*	1.88	0.01
Fear	-0.04	-0.13	0.00	-9.81***	-4.05	0.06	0.01	0.05	0.01
N	348			348			348		

Notes. Initial emotional states and other control variables were included in each regression model. *b* indicates the unstandardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. * $p < .10$. *** $p < .001$.

4.4.2.3 Moderation Effect of Risk-Taking Tendency

To demonstrate mediated moderation, both moderation between promotional offers and risk-taking tendency on emotional states during decision making and the dependent variables must occur. As shown in Table 4.4, there was a significant interaction effect between profit boost tokens and risk-taking tendency on betting selection. Model 8 (moderated mediation) of the Hayes Process Macro was first performed with joviality as a mediator and betting selection as a dependent variable. As shown in Table 4.8, results showed that there was no significant interaction effect of promotional offers and risk-taking tendency on joviality during decision making. When fear was analyzed as a mediator in the model, there was no significant interaction

effect of promotional offers and risk-taking tendency on fear during decision making. When willingness to bet or betting amount was analyzed as a dependent variable in the model, there was still no moderation effect of promotional offers and risk-taking tendency on emotional states during decision making. Therefore, H6 is rejected. When participants received profit boost tokens or risk-free bets, their risk-taking tendency did not significantly increase or decrease their levels of joviality or fear. Since there was no moderation effect of promotional offers and risk-taking tendency on emotional states during decision making, mediated moderation could not be established. H10 is rejected.

Table 4.8

Results of the Moderated Mediation Analysis (Outcome variable: Joviality and Fear)

Variable	*Joviality*		*Fear*	
	β	*t*	*β*	*t*
Profit Boost Tokens	-0.15	-0.56	0.00	0.01
Risk-Free Bets	-0.02	-0.06	0.04	0.17
Risk-Taking Tendency	0.02	0.24	0.02	0.41
Profit Boost Tokens * Risk-Taking Tendency	0.04	0.50	-0.05	-0.74
Risk-Free Bets * Risk-Taking Tendency	0.02	0.22	-0.05	-0.68
Initial Joviality	0.62***	16.61	0.06*	1.76
Initial Fear	-0.01	-0.13	0.69***	16.45
Betting Expenditure on One Sport Bet	0.05*	1.81	-0.01	-0.40
Team Identification with the Minnesota Timberwolves	0.02	0.41	0.03	0.83
Familiarity with the NBA	-0.00	-0.03	-0.14**	-2.67
Familiarity with Sport Betting	0.14	1.71	0.04	0.65
Team Identification with the Los Angeles Clippers	0.05	0.41	0.01	0.22
Years of Betting on NBA games	0.02	0.50	0.01	0.42
N	348		348	
R^2	0.51		0.49	

Notes. The control condition was coded as baseline. Initial emotional states and other control variables were included in each regression model. Each regression model only included control variables that were significantly related to the dependent variable. *β* indicates the standardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. * $p < .10$. ** $p < .05$. *** $p < .001$.

4.4.2.4 Mediating Role of Emotional States during Decision Making

The proposed mediated moderation was not established, and alternative models were run to identify the mediating role of emotional states during decision making. Model 4 (mediation analysis) of the Hayes Process Macro was performed with joviality or fear during decision

making as a mediator and removing risk-taking tendency as a moderator (Figure 4.6). As seen in Table 4.9, the results showed that fear during decision making mediated the relationship between promotional offers and willingness to bet. The direct effects of profit boost ($p = 0.01$, $\beta = 7.27$) and risk-free bets ($p < .001$, $\beta = 8.72$) on willingness to bet were significant. The results revealed a significant indirect effect of profit boost on willingness to bet through fear during decision making ($p = 0.04$, $\beta = 1.41$). The indirect effect of risk-free bets on willingness to bet through fear during decision making was not significant ($p = 0.18$, $\beta = 0.85$). Hence, fear during decision making partially mediated the relationship between profit boost and willingness to bet.

Although the promotional offers significantly increased betting amount and decreased fear, fear did not mediate the relationship between promotional offers and betting amount. Additionally, joviality during decision making did not mediate the relationship between promotional offers and willingness to bet.

Table 4.9

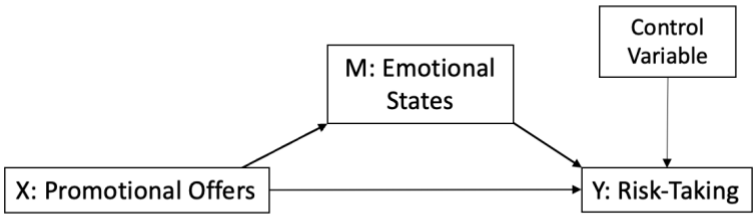
Results of the Mediation Analysis (Fear as a Mediator and Willingness to Bet as a Dependent Variable)

	Total Effect Model		Direct Effect Model		Indirect Effect	
	β	*se*	*β*	*se*	*β*	*se*
Profit Boost	8.68**	2.98	7.27**	2.96	1.41**	0.71
Risk-Free Bets	9.57***	2.98	8.72**	2.94	0.85	0.64
Fear During Decision Making	-	-	-8.47***	2.34	-	-
Familiarity with Sport Betting	10.62***	2.16	10.12***	2.13	-	-
Team Identification with the LA Clippers	2.25**	1.08	2.48**	1.06	-	-
Initial Fear	-3.69**	1.80	2.09	2.38	-	-

Note. The control condition was coded as baseline. Each regression model only included control variables that were significantly related to the dependent variable. *β* indicates the standardized regression weights. *se* stands for the standard error. ** $p < .05$. *** $p < .001$.

Figure 4.7

Mediation Diagram



Note. X is the independent variable. Y is the dependent variable. M is the mediator.

4.5 Discussion

The overall purpose of Study 3 was first to replicate Study 2 with an improved payout structure and then examine if sport bettors' joviality and fear during decision making served as the underlying mechanism of the effect of promotional offers on bettors' risk-taking. Participants were given extra compensation ($5) and were instructed to place a bet (risk-taking) if they wanted to win more money. When participants could choose how much money to wager on the game from the $5 they received, Study 3 found significant effects of both promotions and significant interaction effects that were not detected previously. The differences in the results between Study 2 and Study 3 demonstrate the importance of simulating a real gambling scenario and involving risk factors in an experiment to study betting decisions. Additionally, although the results did not support the proposed mediated moderation model, the current study demonstrates the important role of fear in responses to gambling promotional offers, as both profit boost tokens and risk-free bets decreased fear when sport bettors placed a bet. In addition, the results showed that fear decreased customers' willingness to place a bet and partially explained the effect of profit boost tokens on willingness to bet. Study 3 provides further insight on how gambling promotional offers affect sport bettors' decision making and suggests the important role of negative emotion (e.g., fear) in sport betting and gambling marketing.

First, by providing participants with $5 and allowing the flexibility to choose the amount of money wagered on the game, a significant main effect of promotional offers on participants' betting amounts and willingness to bet was found. The findings showed that both profit boost tokens and risk-free bets significantly increased the amount of money participants wagered on the game and their willingness to place the bet. In addition, through offering credit back to reduce perceived risk, risk-free bets were more effective in increasing betting amount on the

game and sport bettors' willingness to place the bet than profit boost tokens. Findings suggest that sport bettors may not place riskier bets to chase for higher payouts when they receive promotional offers, but they would risk more money on the game and show more willingness to participate in sport betting.

While promotional offers can increase betting enthusiasm and expenditure, the current study found that the effect of promotional offers depends on individuals' risk-taking tendency. When participants received risk-free bets, those with a lower risk-taking tendency placed riskier bets and wagered more money than those with a higher risk-taking tendency. Low- risk takers took more risks than high- risk takers under the "no risk" framing. When participants received profit boost tokens or no promotion, the opposite pattern was found. Compared to the results of Study 2, risk-taking tendency had a more pronounced moderating impact when participants received a higher amount of money to bet. As discussed in Study 2, the risk-reduced message can significantly mitigate risk perceptions and increase risk-taking among low- risk takers who are sensitive to risk (Sitkin & Weingart, 1995). In contrast, the reduced risk in the promotion may not be influential to high- risk takers who prefer risks. Thus, risk-reduced gambling promotions can be more effective toward low- risk takers. However, sport bettors with a lower risk-taking tendency still showed less willingness to place the bet when they received risk-free bets compared to those with a higher risk-taking tendency. In Study 2, there was no significant difference in willingness to bet between low- and high- risk takers in the risk-free bets condition. It could be because in the current study, the riskier betting decisions lower willingness to place the bet among low- risk takers.

Regarding the effect of promotional offers on emotional states during decision making, neither profit boost tokens nor risk-free bets significantly increased or decreased joviality.

Previous studies suggest that gambling promotional offers can increase sport bettors' positive emotions such as excitement and joy and enhance the overall betting experience (Lamont et al., 2016). For example, promotional offers emphasizing better odds and winnings are perceived as attractive, capturing attention, and generating interest (Lamont et al., 2016; Lole et al., 2020; Rockloff et al., 2019). However, in the current study, participants did not exhibit higher levels of joviality when they received promotional offers. It could be because participants had $5 available to bet on the game, an amount lower than what most participants (82.18%) usually wager on one sport bet. Consequently, the lower wagers and relatively modest increase in potential winnings due to the promotional offers may not have significantly enhanced participants' joviality. If participants wager a higher amount of money on the game, the greater increase in potential payouts resulting from the promotional offers might enhance participants' joviality.

Instead, despite participants wagering lower amounts and not risking their own money, both promotional offers resulted in a decrease in participants' fear during decision making. Gambling involves risks, and sport bettors may feel nervous and scared when they risk their money (e.g., Dwyer & LeCrom, 2013; Lopez-del-Hoyo et al., 2022; Ofosu & Kotey, 2019). Providing gambling promotional offers is an effective strategy to make sport bettors feel less nervous and distressed when they place a bet. Moreover, it is counterintuitive that the effect of profit boost tokens on decreasing fear was more pronounced compared to risk-free bets. As proposed in this study, risk-free bets might be more effective in decreasing fear during decision making because they provide credits back if sport bettors lose their bets. Profit boost tokens may not decrease fear since they do not offer security for risky activities. However, the results showed that increased winning opportunities significantly reduced fear in sport bettors without

offering security. The findings also suggest that in sport betting promotions, increased profits can be more effective in reducing negative emotions such as fear than reduced risk.

Furthermore, the findings suggest that during the betting process, when sport bettors experience higher levels of joviality or lower levels of fear, they are more willing to place a sport bet. In addition, when possessing higher levels of joviality, they would wager more money on the game. The findings sustain past work on emotion in risk decision making, in which individuals' emotional states during decision making can impact their willingness to participate in risky activities such as sport betting and their tendencies to take risks (Cheung & Mikels, 2011; Druckman & McDermott, 2008). Positive emotions such as joviality can lead to preferences for risky activities (Bartholomeyczik et al., 2022), while negative emotions such as fear decrease participation in risk and uncertainty (Marcus et al., 2005; Slovic et al., 2005). However, joviality during decision making might only increase customers' willingness to participate in sport betting and wager amounts on their bets, without necessarily affecting their choice of bets. Moreover, fear during decision making may not affect sport bettors' choice of bets or wager amounts.

The results did not support the proposed mediated moderation model, but Study 3 still offers evidence for the mediating role of emotional states during decision making. Fear during decision making partially explained how profit boost tokens increased participants' willingness to place the bet. To be specific, profit boost tokens significantly reduced fear during the decision-making process in sport betting, which in turn increased participants' willingness to place the bet. Sport bettors could be attracted to gambling promotions due to the positive emotions they produce (Binde, 2007; David et al., 2019; Lole et al., 2020), and they may be aroused when they receive better odds and other tempting rewards (Lamont et al., 2016). At the same time, we cannot ignore the negative emotions that sport bettors experience during the betting process and

how gambling promotional offers can increase betting intention and participation through lowering negative emotions such as fear in the decision-making process. The current study suggests that fear can play a more important role than joviality in explaining the effect of gambling promotional offers, and negative emotions during the betting process can serve as critical underlying mechanisms of risk taking in sport betting.

Furthermore, this research provides methodological advancement for the sport betting literature. With an improved payout structure in Study 3, the findings revealed significant effects of both promotional offers and significant interaction effects that I did not find in Study 2. While few sport betting promotion studies use experimental design to create realistic betting tasks and incentives (e.g., Deans et al., 2016; Hing et al., 2014c; Rockloff et al., 2019), the current study design adds to the sport betting literature by providing an example of how to create betting scenarios and risk factors in betting experiments to study betting decisions. Researchers can use actual games to create betting tasks and give a certain amount of money to participants upfront, allowing participants to choose how much money they want to risk. The results of Study 2 and Study 3 highlight the efficacy and necessity of employing experimental design with risk factors to identify sport bettors' risk-taking behavior.

4.5.1 Theoretical Significance

By creating a realistic betting scenario in the experiment, the current study contributes to sport betting literature by confirming the influential role of gambling promotional offers in increasing sport bettors' risk-taking levels when they place a bet. Sport bettors' higher risk-taking levels were reflected in higher betting expenditure and greater willingness to place the bet. Study 3 again illustrated the critical role of individuals' risk-taking tendency in the effect of

gambling promotional offers and in risk decision-making models, suggesting the importance of incorporating bettors' personal characteristics in studying betting decisions.

Pertaining to emotional states during the decision-making process, the findings highlight the important role of negative emotions such as fear in responses to gambling promotional offers and in betting decision making. Previous sport betting studies frequently discussed how positive emotions such as excitement can motivate participation in sport betting (Killick & Griffiths, 2021; Lamont & Hing, 2018; Lole et al., 2020). Regarding emotional responses to gambling promotional offers, a handful of previous studies have explored that gambling promotions can increase positive emotions such as excitement, joy, and interest (e.g., David et al., 2019; Dwyer & Lecrom, 2013; Lamont et al., 2016). However, little is known about how these promotions affect negative emotions such as fear during the betting process. Study 3 adds to sport betting literature by identifying that gambling promotions can lower fear during the betting process, and reducing fear can increase individuals' willingness to participate in sport betting. Surprisingly, providing higher winnings are more effective in lowering fear than offering risk-reduced betting. Thus, sport betting studies investigating gambling promotional offers should not ignore the role of negative emotions, and fear is among the most important emotions in the betting process and in responses to gambling promotions.

In addition, the findings contribute to sport marketing literature by introducing the mediating role of customers' negative emotions in the effectiveness of gambling marketing techniques. Previous studies suggest that gambling advertising and relevant content lead to more positive emotional reactions such as excitement and enjoyment, which subsequently facilitate higher betting intentions and desire to bet (e.g., De Jans, 2022; Lole et al., 2020; Xu et al., 2021). At the same time, fear reduces betting intentions and keeps individuals from betting on sports

(Jackson et al., 2023). Gambling promotions such as profit boost tokens can increase the desire to bet through lowering customers' fear during the betting process. Customers' negative emotions should be taken into consideration in gambling marketing strategies.

Through investigating emotional states during decision making in sport betting, this study advances our understanding of the role of emotion in risk decision making. The findings of the study are resonant of the established influence of emotion during decision making on risk-taking behavior, wherein positive emotion such as enthusiasm leads to preferences for risky activities and intensity risk-taking (Bartholomeyczik et al., 2022; Druckman & McDermott, 2008), and negative emotion such as nervousness and distress leads to avoidance of risk (Slovic et al., 2005). In addition, the results revealed that individuals' joviality and fear during decision making critically impact their willingness to participate in risky activities. Joviality during decision making can also increase their financial investment under uncertainty.

4.5.2 Practical Implications

Study 3 offers several noteworthy insights for sport betting marketers and operators. First, the results of Study 2 and Study 3 may suggest that when sport bettors have a larger amount of money available (e.g., $5 available compared to $2) to wager on the game, gambling promotional offers can increase their willingness to place a bet. Thus, gambling promotional offers may work better toward sport bettors who have a higher budget for sport betting. In addition, in line with the suggestions in Study 2, risk-reduced promotions and advertising are effective gambling marketing techniques to target low- risk takers and can increase their participation in sport betting and their wager amounts. In contrast, higher winning promotions may not work among low- risk takers and could be counterproductive toward this group of sport bettors. Higher winning promotions can be used to target sport bettors who have a higher risk-

taking tendency. Sportsbooks can utilize data from the betting platforms such as customers' previous bets, betting patterns, expenditure, and betting frequency to deduce customers' betting experience and risk-taking tendency and target them with specific promotions.

Regarding emotions, the results inform sportsbook operators of the negative emotional states (i.e., fear) that customers experience in betting. To attract people to participate in sport betting, it is important to lower customers' fear and worry about betting, and one effective strategy is to provide higher winning promotions such as profit boost. Risk-reduced promotions such as risk-free bets can lower customers' fear as well, but counterintuitively, higher winnings are more effective than no risk in reducing fear in sport bettors. Sportsbooks should continue to explore other techniques that can lower customers' distress and nervousness in betting. At the same time, this study found the important effect of joviality during decision making. Gambling marketing techniques should aim to evoke joviality and enhance audiences' positive emotional experiences to attract and retain customers. Besides marketing techniques, sportsbooks should identify other factors (e.g., user interface design of betting applications, graphics, sounds) that can enhance sport bettors' joviality when they bet, and online sportsbook platforms and local casinos can create a more exciting and enthusiastic atmosphere for their customers to increase betting engagement.

Meanwhile, the results inform gambling regulation authority and problem gambling organizations that sport bettors' emotional states have a critical relationship with their betting intention, and their risk-taking and problematic gambling could be tied to their emotions in the betting process. It is important to regulate the placement of important terms and conditions associated with the promotional offers and alert customers about the potential risk and loss. Maintaining a certain level of fear and anxiety about losing money in the betting process can

help sport bettors “stop, think, and adjust behavior” (Marcus et al., 2005, p.950) and decrease engagement in risky betting behavior.

4.6 Limitations and Future Studies

First, the study measured participants’ emotional states by using self-report measures of emotion in the questionnaire. Self-reported emotion may not be very accurate and reflect participants’ true reactions. In future research, physiological measure (e.g., smartwatch data) can be used to capture sport bettors’ emotional processing. Same as Study 2, results of the current study may be limited to participants where they have previously bet on the NBA and consumed NBA content. The low variation in risk-taking tendency may again limit the ability to detect significant interactions in the analyses. In addition, the participants bet on sports and were familiar with betting promotions. Eighty-two percent of the sample reported that they normally wager more than $5 on one sport bet. The betting promotions were not novel to these participants, and the relatively low wager amounts and small increase in winnings might not significantly enhance their level of joviality. Future research can consider recruiting new and less-experienced bettors and investigate if betting promotions can enhance their joviality and subsequently increase their betting engagement. Moreover, participants did not risk their own money in the experiment. Although participants chose to risk how much money they received, their emotional states may not be significantly affected by the experimental stimuli or their risk-taking tendency without the possibility of losing their own money. Future research can utilize other methodologies such as observational studies in a lab to observe and measure sport bettors’ emotional reactions when they place bets under the effect of promotions.

Another limitation of this study was that participants completed the experiment online, and there could be environmental factors that influenced participants’ emotion when they

completed the experiment. Although the study used an experimental design to control factors that may influence participants' emotional states and decision making, the online experiment cannot control the time, the environment, and other situational elements when participants bet on the game. For example, participants may be watching exciting movies or having fun conversations with friends when they were completing the online experiment, and participants' emotional states could be influenced by other tasks. A lab experiment could be employed to capture and study emotions in future studies.

The current study only found that fear during decision making partially explained the effect of profit boost tokens on willingness to bet. Underlying mechanisms of other discovered promotional offer effects are still unknown. For example, why do risk-free bets work effectively toward low- risk takers? Future studies should further identify other emotional or cognitive processing (e.g., perceived risk, self-assurance) in sport bettors' that can explain the effect of gambling promotional offers and advance our understanding of risk-taking under the framing effect in gambling marketing. Mediation analysis with multiple mediators can also be used to provide a better understanding of the reasoning behind a betting decision.

Chapter 5 Conclusion

5.1 Important Findings and Contributions

Although extant research has examined betting decision making, an updated and further understanding of sport bettors' decision making and risk-taking is needed due to the recent expansion of legal sport betting in the United States, the ease to bet on a number of online sport betting platforms, and the unique marketing techniques in the dynamic sport betting industry. The process of making a betting decision could be more complicated today. To understand the crucial external and internal factors when sport bettors make decisions under uncertainty, this dissertation employed an experimental design and explored how and why sport bettors shift their decisions and risk-taking levels. The present dissertation contributes to the existing literature by providing an enhanced understanding of betting decision making under the effect of heuristics and marketing frames as well as personal characteristics, and exploring the psychological underpinnings of risk-taking in sport betting.

Using heuristic decision making as the theoretical framework, this dissertation first discovered how sport bettors shifted their choice of bets according to changes of betting odds. The results revealed that sport bettors would identify opportunities through scrutinizing betting odds, either a betting option that is safe and easy to win or a betting choice that provides higher payouts. In addition, when identifying opportunities, sport bettors are more likely to place the bet and increase their betting expenditure. Study 1 viewed and tested betting odds as important heuristics that can be used to inform betting decisions, and provided evidence of the important role of heuristics in sport betting and decision making under uncertainty. The results support the

proposition that using heuristics is unavoidable in decision making under uncertainty and heuristic decision making could be effective (Gigerenzer & Gaissmaier, 2011) in sport betting. The findings also provide important practical implications. Manipulating betting odds and providing promotional offers are two important strategies to influence customers' betting intentions and decisions. Allowing customers to discover winning opportunities in the betting lines or gambling promotions is an effective way to encourage their participation and increase their betting expenditure, which would benefit the long-term profits of sportsbooks. Lastly, Study 1 suggests the power and potential harm of odds-related promotions.

After identifying the effect of odds-related promotions, Study 2 and Study 3 focused on gambling promotions and investigated two commonly used promotions in the current betting industry, as well as how these two promotions influenced betting decisions among different groups of customers. The studies viewed gambling promotional offers as one of the marketing messages that frame betting consequences differently to change decision making, and personal characteristics of the decision-maker play an important role in framing effect. The findings add new insights into the effect of gambling promotions by revealing that experienced sport bettors are more willing to place a bet when promotional offers are available, but they would take less risks to secure winnings. In contrast, sport bettors with less experience may exhibit higher risk-taking under the effect of promotional offers. Regarding sport bettors' risk-taking tendency, risk-reduced promotions work effectively toward low- risk takers, while higher winning promotions attract high- risk takers. Personal characteristics can significantly impact risk-taking levels under the framing effect in betting. It is important to take customers' individual differences into account to comprehend the effect of marketing framings. These insights provide suggestions for sportsbooks when they develop and plan their gambling promotions to target different groups of

customers, and encourage further knowledge of sport bettors' personal characteristics for customized marketing strategies.

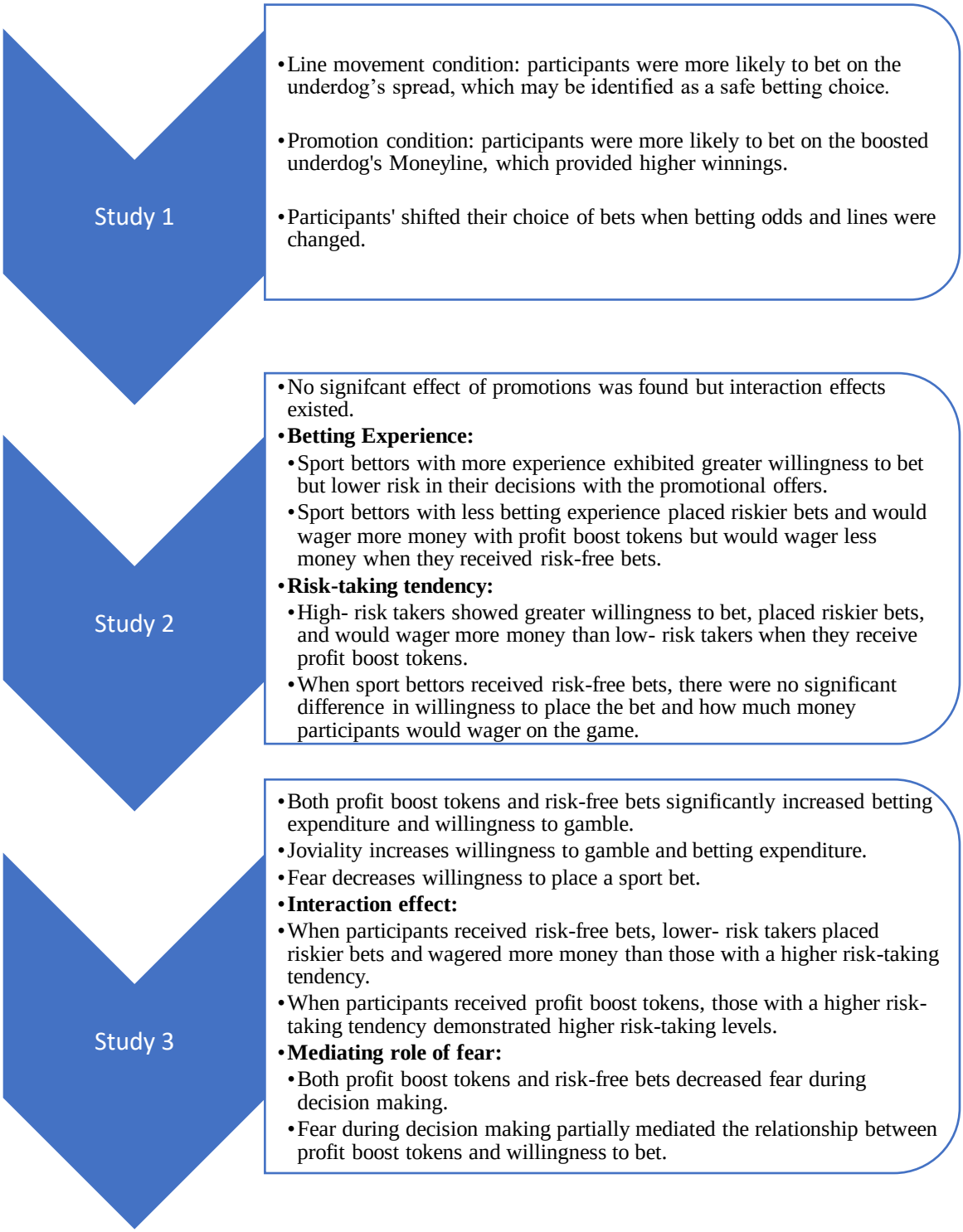
Due to the different payout structures used in Study 2 and Study 3, the findings showed slightly different patterns. First, when participants received a higher amount of money and had the flexibility to choose how much money to bet on the game, a significant main effect of promotional offers on willingness to bet and betting expenditure was found. The different patterns may suggest that promotional offers work more effectively when sport bettors have a higher budget for sport betting. In addition, the influence of risk-free bets on sport bettors who have a lower risk-taking tendency was more pronounced in Study 3, and the results of both studies suggest the effectiveness of risk-reduced promotions among low- risk takers, especially when they have more money to wager more money on the game.

In addition, less is known about fear and other negative emotions when customers react to gambling promotions and other marketing techniques. The present dissertation emphasizes the role of fear in responses to gambling promotions. Promotional offers, especially higher winning opportunities, can significantly lower sport bettors' fear during decision making. Study 3 also discovered that fear during decision making explained the effect of profit boost tokens on participants' willingness to place a bet. Meanwhile, joviality and fear can predict individuals' risk-taking behavior in sport betting, which fell in line with previous research (e.g., Slovic et al., 2005). Although the proposed mediated moderation model was not supported, Study 3 highlights the crucial link between emotional experiences during decision making and risk-taking levels in betting and emphasize the role of emotion in risk decision making. To increase betting consumption and retain customers, sportsbooks can explore techniques to enhance joviality during the betting process as well as to lower customers' fear when they place bets.

In summary, this dissertation investigated the impact of external (i.e., betting odds, promotional offers) and internal (i.e., individual characteristics, emotion) factors on sport bettors' decision making. Looking at the effect of two external factors, we can find that low-risk opportunities in betting such as safe bets existed in the betting lines or risk-free bets can attract bets and higher wagers. Offering low risk in risky activities is one effective way to attract potential and new customers to participate in betting. Higher winning opportunities in betting such as boosted underdog Moneyline odds in a close matchup or profit boost tokens is another influential way to increase bets placed and betting involvement. Low risk and high pays are two crucial elements in promoting sport betting. At the same time, we should not look solely at external factors. To better comprehend the effect of external factors on betting decisions, it is important to consider customers' characteristics in the decision-making process and understand the underlying mechanisms. Once again, the process of making a betting decision could be more complex, and understanding the reasoning behind a betting decision can be beneficial to relevant stakeholders and decision making under risk research.

Figure 5.1

Summary of Dissertation Key Findings



5.2 Major Limitations and Future Research

One major limitation of this dissertation was that in the experiments, participants did not risk their own money on the game. It is challenging to create a real gambling scenario in an experimental design. Without facing the risk of losing money, participants' emotional states might be less influenced by the promotional offers and individuals' risk-taking tendency. For example, while this dissertation did not find a significant interaction effect of risk-taking tendency and promotional offers on participants' joviality or fear, participants' emotional states and risk-taking levels might be more influenced by this interaction if they wager with their own money. Participants might also report riskier choices in the experiment. For example, in Study 1, if participants risked their own money on the game, they might be less likely to bet on the underdog Moneyline with boosted odds compared to just reporting their betting selection. Despite this limitation, this dissertation offers valuable insights into the effects of various factors on betting behavior in a controlled setting, and future research can adopt different methodologies such as observational studies to further investigate the research questions and hypotheses in this dissertation. For example, researchers can recruit new and experienced sport bettors and ask them to report their bets and any use of promotional offers over a specific period of time. This method can facilitate data collection of sport bettors' decisions and behavior and data can be used to identify group differences and betting patterns.

In addition, online experiment cannot control the time and environment in which participants complete the betting task, and participants' emotional states could be influenced by the stimuli in the experiment as well as other factors that could not be controlled by the researchers. Also, the online experiment cannot control how much time participants used to complete the task. Some participants took less than 5 minutes to complete the experiment, while

some used more than 30 minutes. Those who took longer time to complete the task were more likely to be influenced by other environmental factors that were not related to sport betting and promotions. Participants who rushed to complete the online experiment might pay less attention to the stimuli and experience less emotional changes. The duration of time taken to complete the betting task could also potentially influence the decisions. Thus, future research can consider using lab experiments and physiological measures to control the environment and capture sport bettors' emotional states when they place bets and test the proposed mediating role of emotion in sport betting. For example, researchers can invite participants to place bets in a lab and use equipment such as a smartwatch to measure bettors' electrodermal activity or heart rate.

This dissertation also provides several directions for future research. First, sport bettor characteristics play a dominant role in betting decision making, and future studies can further identify personal characteristics that can affect sport bettors' responses to gambling promotional offers and their decision making under uncertainty. This dissertation only examined two promotional offers, and future studies can continue to investigate the effectiveness of other gambling promotions (e.g., deposit match, bonus bets) and marketing techniques (e.g., influencer marketing, content marketing) in the industry. Another interesting avenue for future research is to continue exploring the underlying mechanisms of risk taking in sport betting. The current study only tested the mediating role of joviality and fear, and future studies can further examine other emotional processing (e.g., self-assurance) in the betting process, sport bettors' perceptions (e.g., risk perceptions), or information processing to explore the reasoning behind a decision in sport betting. Meanwhile, through studying risk-taking and the underlying mechanism in the context of sport betting, we can have a better understanding of human decision making and behavior under risk and uncertainty. To provide a deeper understanding of sport betting

behavior, future studies should adopt cross-disciplinary approaches and integrate insights from psychology, economics, and data science.

To navigate the new era, future research can look at how technological innovations, artificial intelligence (AI), and big data analysis assist decision making in sport betting. For example, sportsbooks are using AI to set betting odds and lines more accurately and reduce the risk of significant losses. Sportsbooks can also use AI to understand their customers and assist their promotion design and planning processes. At the same time, sport bettors can use generative AI such as ChatGPT's advanced data analysis to analyze a large set of sport data and make a betting decision. One avenue for future research can be to observe and understand how sport bettors utilize these advanced tools to assist their decision making under uncertainty, and explore whether new technology can positively optimize betting decisions and improve betting performance. With the help of technology, will sport bettors become smarter or more overwhelmed? Technology such as generative AI can provide sport bettors with advanced analysis and more information. However, under uncertainty, will new technology offer reliable information for sport bettors to make a decision, or will it be another source of overconfidence and illusion of control? Sport betting studies should keep track of the technology used in sport betting and explore the impact of new technology on betting behavior and the sport betting industry.

5.3 Concluding Remarks

Making decisions can be difficult. Making sport betting decisions can be more stressful due to uncertainty in sporting events and the risk of losing money. In today's sport betting industry, the process of placing a sport bet becomes more complicated, which may include analysis of relevant information, utilization of promotional offers, and comparison between

different betting platforms for better payouts, etc. Sport bettors' emotional and cognitive processing of relevant information and situational cues during the betting process could also become more complex. While the sport betting industry is rapidly expanding and changing, sport bettor behavior is evolving as well. I hope this dissertation contributes to future research on decision making in the dynamic sport betting world and human behavior under risk and uncertainty.

Appendices

Appendix A: Betting Instructions for the Experiments

1. Betting Instructions for Study 1 Experiments:

Assume you are placing a single bet on the following NFL game. You can place either a Moneyline bet **or** a Point Spread bet. Please report your betting decision and feelings.
This is a hypothetical betting scenario. You will NOT receive the payouts after your wager, but we sincerely ask you to report your true betting decision and reactions.

2. Betting Instructions for Study 2 Experiments:

Please read the betting instructions carefully.
Assume you have **$2** to place a bet, and you are betting on the **alternative spread of the following NBA game**. You will see the game and the alternative spread on the next page.

After viewing the betting odds and selections, please report your betting decision and reactions, and after the basketball game concludes, you WILL receive the total payout through Bonus Payment on Prolific if your bet settles as a win. For example, if you bet the $2 you have on +200 odds and your bet settles as a win, you will receive $6 through Bonus Payment. The payment will be made on Prolific in 3 business days after the game concludes.

3. Betting Instructions for Study 3 Experiments:

Please read the betting instructions carefully.
Assume you have **$5** to place a bet, and you are betting on the **alternative spread of the following NBA game**. You can bet all the $5 you receive or part of the $5 on the game. **You must bet at least $0.5 on the given game**, and you will receive the remaining money you do not use. After the game concludes, you will receive the total payout if you bet settles as a win. The winnings and the remaining amount of money will be paid through "Bonus Payment" on Prolific.

For example, if you bet the $2 you have on +200 odds and your bet settles as a win, you will receive $6 (total payout) and $3 (money you do not use) through Bonus Payment. The payment will be made on Prolific in 3 business days after the game concludes.

You will see the game and the alternative spread on the next page. After viewing the betting odds and selections, please report your betting decision and reactions.

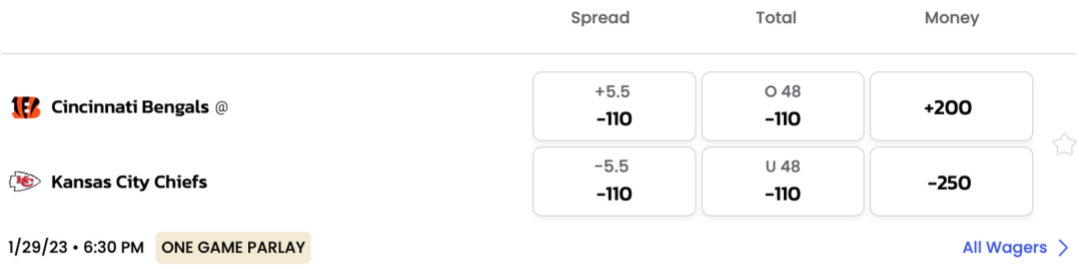
Appendix B: Study 1 Betting Tasks in Three Experimental Conditions

Appendix Figure B. 1: Control Condition Betting Task



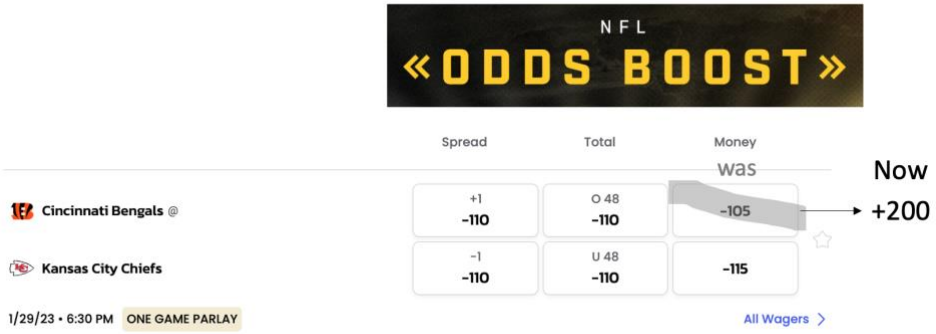
Please place your bet selection.

Appendix Figure B. 2: Line Movement Condition Betting Task



Please place your bet selection.

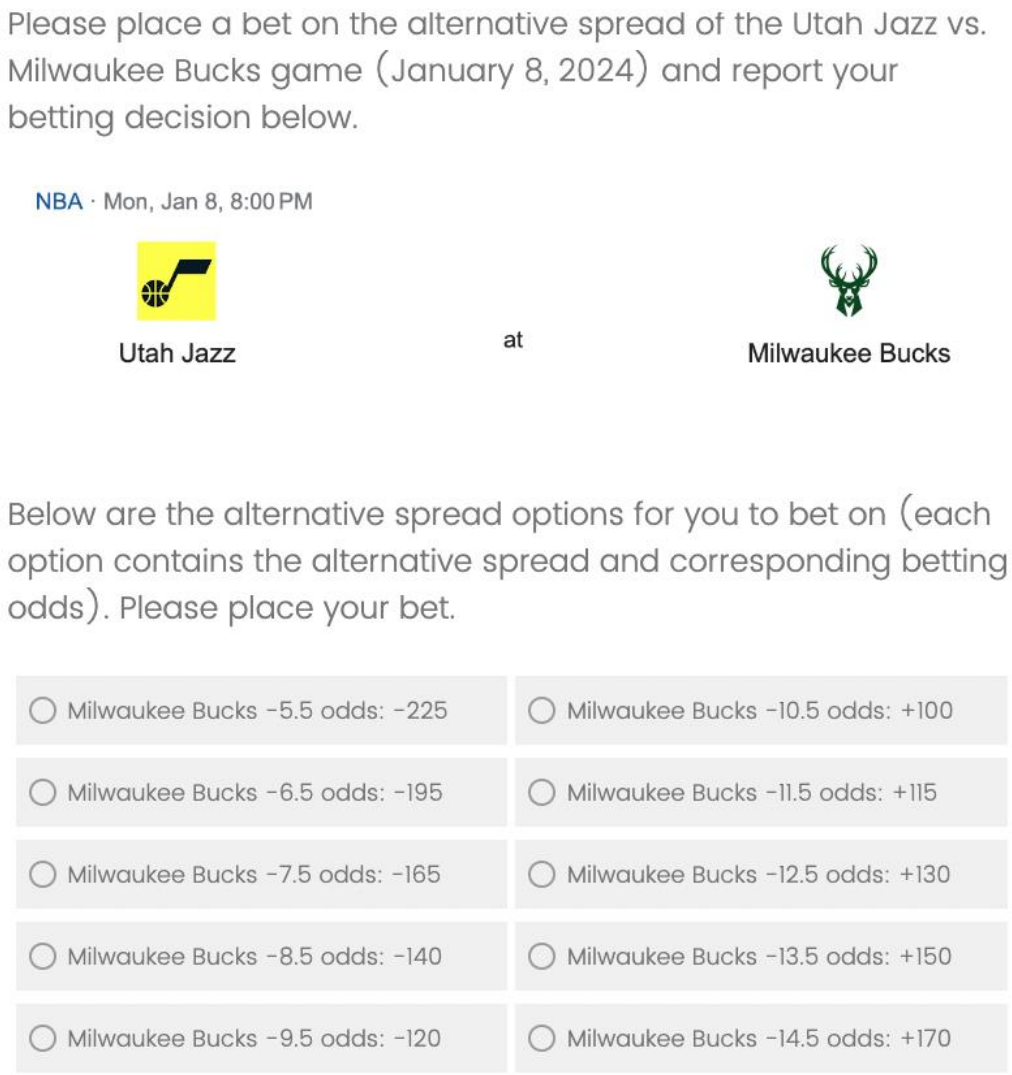
Appendix Figure B. 3: Promotion Condition Betting Task



Please place your bet selection.

Appendix C: Betting Task for Study 2 and 3 Experiments

Appendix Figure C. 1: Study 2 Betting Task



Appendix Figure C. 2: Study 3 Betting Task

Please place a bet on the alternative spread of the Los Angeles Clippers vs. Minnesota Timberwolves game (January 14, 2024) and report your betting decision on the next page.

NBA · Sun, Jan 14, 7:00 PM

LA Clippers at Minnesota Timberwolves

Below are the alternative spread options for you to bet on.

Alternative Spread	Odds
Minnesota Timberwolves -5.5	+200
Minnesota Timberwolves -4.5	+175
Minnesota Timberwolves -3.5	+154
Minnesota Timberwolves -2.5	+135
Minnesota Timberwolves -1.5	+114
Minnesota Timberwolves +1.5	-110
Minnesota Timberwolves +2.5	-125
Minnesota Timberwolves +3.5	-145
Minnesota Timberwolves +4.5	-166
Minnesota Timberwolves +5.5	-195

Appendix D: Promotional Offers for Study 2 and 3 Experiments

Appendix Figure D. 1: Profit Boost Tokens



Congratulations! You just received a **Profit Boost Token!** Add a 50% Profit Boost to your bet and **WIN MORE MONEY!**
For example, if you place a bet at +110 odds and win the bet, you will receive a $1.10 profit boost and receive a $5.30 payment in total.
You will not risk your own money.

Appendix Figure D. 2: Risk-Free Bets



Congratulations! You just received a **Risk-Free Bet!** If you bet settles as a loss, you'll **RECEIVE YOUR STAKE BACK**!
For example, if you place a bet at +110 odds and win the bet, you will receive a $2.20 winning and a $4.20 payment in total. If you lose the bet, you will receive the $2 stake back.
You will not risk your own money.

Appendix E: Constructs and Items Used in the Experimental Studies

Construct	Item
Betting Selection	Please place your bet (i.e., choice of bets).
Betting Units	Please indicate the maximum units you are willing to wager (0 – 100; 100 units = amount of money that you usually bet on a single sport betting session).
Willingness to Bet	What is your willingness to make the wager you just saw (0-least, 100-most)?
Betting Amount	Please indicate the amount of money you want to wager on the game out of the $5 you received.
Perceived Confidence	How confident do you feel that your bet will win (0-least, 100-most)?
Perceived Risk	How risky do you feel that your bet selection was (0-least, 100-most)?
Betting Experience (D'Astous & Gaspero, 2015; Griffin et al., 1996)	I am a very experienced NBA bettor. I bet on NBA games frequently. How frequently do you bet on NBA games during one NBA season?
Risk-Taking Tendency (adapted from Meertens & Lion, 2008; Weber et al., 2002)	I do not take risks with my money. (R) Safety first. (R) I view myself as a risk seeker. I prefer to avoid risks. (R) I take risks regularly. I really dislike not knowing what is going to happen. (R)

Construct	Item
Emotional States during Decision Making (adapted from Watson et al., 1988)	During the process of deciding which alternative spread to bet on, to what extent do you feel excited?
	During the process of deciding which alternative spread to bet on, to what extent do you feel interested?
	During the process of deciding which alternative spread to bet on, to what extent do you feel enthusiastic?
	During the process of deciding which alternative spread to bet on, to what extent do you feel attentive?
	During the process of deciding which alternative spread to bet on, to what extent do you feel distressed?
	During the process of deciding which alternative spread to bet on, to what extent do you feel scared?
	During the process of deciding which alternative spread to bet on, to what extent do you feel nervous?
	During the process of deciding which alternative spread to bet on, to what extent do you feel jittery?

Appendix F: Betting Behavior and Demographic Measures

Construct	Item
Familiarity	How familiar are you with - sport betting; NFL; NBA
Betting Frequency	How often do you bet on sports?
Betting Apps Used Primarily	Which betting apps do you use primarily?
Betting Expenditure	How much money do you usually bet on a single sport betting session?
Years of Betting	How long have you been betting on NFL/NBA games?
Team Identification	I consider myself a fan of [team name].
	Being a fan of [team name] is very important to me.
	I feel proud of the [team name]'s accomplishments.
Age	What is your age?
Ethnicity	What is your ethnic background?
Gender	What gender do you identify as?

Appendix G: Robustness Check for Study 2 and Study 3

Appendix Table G. 1: Interaction Effects on the Dependent Variables in Study 2 (Only Risk-Taking Tendency was Included as a Moderator)

Variables	Betting Selection		Willingness to Bet		Betting Units	
	β	*t*	*β*	*t*	*β*	*t*
Betting Expenditure on One Sports Bet	0.15	1.31	-0.29	-0.28	-0.04	-0.70
Familiarity with the NBA	-0.77**	-2.89	0.96	0.38	-0.14	-1.13
Age	0.00	0.25	0.32**	2.59	0.01**	2.39
Betting Frequency	-0.08	-0.80	1.63	1.79	0.01	0.18
Familiarity with Sport Betting	0.36	0.96	5.88**	1.95	0.16	1.06
Team Identification with the Milwaukee Bucks	-0.03	-0.23	0.96	0.87	0.15**	2.67
Risk-Taking Tendency	0.46	1.47	2.95	1.04	0.07	0.48
Profit Boost	0.22	0.61	-0.05	-0.01	-0.13	-0.76
Risk-free Bets	0.15	0.44	1.62	0.49	-0.22	-1.28
Profit Boost * Risk-Taking Tendency	-0.08	-0.21	5.25*	1.04	0.13	0.69
Risk-Free Bets * Risk-Taking Tendency	-0.12	-0.30	-0.11	-0.03	0.03	0.16
N	375		375		375	
R^2	0.05		0.12		0.08	

Note. The control condition (no promotion) was coded as baseline. Each regression model only included control variables that were significantly related to the dependent variable. *β* indicates the standardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. * $p < .10$. ** $p < .05$.

Appendix Table G. 2: Interaction Effects on the Dependent Variables in Study 2 (Only Betting Experience was Included as a Moderator)

Variables	Betting Selection		Willingness to Bet		Betting Units	
	β	*t*	*β*	*t*	*β*	*t*
Betting Expenditure on One Sports Bet	0.22	1.93	0.60	0.49	-0.02	-0.45
Familiarity with the NBA	-0.83**	-3.06	-0.08	-0.03	-0.20	-1.60
Age	-0.00	-0.02	0.29**	2.39	0.02**	2.50
Betting Frequency	-0.00	-0.03	-0.17	-0.15	0.01	0.24
Familiarity with Sport Betting	0.43	1.12	5.38*	1.74	0.18	1.18
Team Identification with the Milwaukee Bucks	0.02	0.18	1.00	0.89	0.15**	2.71
Betting Experience	-0.04	-0.13	4.48*	1.64	0.06	0.47
Profit Boost	0.30	0.84	1.32	0.39	-0.10	-0.60
Risk-free Bets	0.18	0.52	1.96	0.59	-0.22	-1.31
Profit Boost * Betting Experience	-0.03	-0.10	-0.71	-0.23	-0.20*	-1.33
Risk-Free Bets * Betting Experience	-0.05	-0.14	0.13	0.04	0.14	0.89
N	375		375		375	
R^2	0.05		0.12		0.08	

Note. The control condition (no promotion) was coded as baseline. Each regression model only included control variables that were significantly related to the dependent variable. *β* indicates the standardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. * $p < .10$. ** $p < .05$.

Appendix Table G. 3: Interaction Effects on the Dependent Variables in Study 3 (Only Risk-Taking Tendency was Included as a Moderator)

Variables	Betting Selection		Willingness to Bet		Betting Amount	
	β	*t*	*β*	*t*	*β*	*t*
Familiarity with Sport Betting	0.35	1.23	10.00***	4.31	0.05	0.37
Team Identification with the Los Angeles Clippers	-0.13	-0.81	2.72*	1.84	0.07	0.70
Years of Betting on NBA games	0.05	0.33	-0.34	-0.34	-0.11	-1.51
Betting Expenditure on One Sports Bet	-0.08	-0.67	-0.27	-0.28	0.20**	2.98
Team Identification with the Minnesota Timberwolves	0.40**	2.36	-1.81	-1.21	-0.20**	-2.12
Risk-Taking Tendency	-0.27	-0.92	2.30	0.79	0.05	0.32
Profit Boost	0.40	1.04	7.38**	2.35	0.48**	2.30
Risk-free Bets	-0.30	-0.78	8.23**	2.51	1.00***	4.59
Profit Boost * Risk-Taking Tendency	0.01	0.01	1.85	0.53	0.31	1.39
Risk-Free Bets * Risk-Taking Tendency	0.63*	1.56	-0.30	-0.08	-0.20	-0.89
N	348		348		348	
R^2	0.04		0.14		0.15	

Note. The control condition (no promotion) was coded as baseline. Each regression model only included control variables that were significantly related to the dependent variable. *β* indicates the standardized regression weights. *t* represents the ratio of the estimated coefficient of a predictor variable to its standard error. * $p < .10$. ** $p < .05$. *** $p < .001$.

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