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The Near-Miss Effect in Blackjack: Group Play and Lone Play

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Previous research in blackjack has demonstrated that gamblers report outcomes that are closer to wins when the player's total approximates the dealer's total. However, additional comparisons, such as to another player's total or to 21, may affect the prevalence of a near-miss. The current study investigated the presence of a near-miss in blackjack while playing alone and with other players, and examined ratings in relation to the difference of the player's, dealer´s and another player´s total from 21. College students played 25 hands of blackjack with only the dealer and another 25 hands with another player and the dealer and rated how close the outcome was to a win. The results demonstrated the presence of a near-miss effect as a function of the numerical distance from the player's and another player´s total to 21, and the absence of a near-miss when the player busts.

Keywords: Blackjack, gambling, near-miss, social

The number of studies investigating pathological gambling has increased as researchers gradually learn more about the complex behavioral phenomena (Dixon, Nastally, Hahs, Horner-King, & Jackson, 2009). One significant emerging factor frequently examined in the gambling literature is the "near-miss" effect. For example, previous research has demonstrated that both non-gamblers and pathological gamblers alike demonstrate a near-miss effect, and that pathological gamblers exhibit similar physiological responses to near-miss and winning outcomes. In this way, near-miss outcomes may significantly influence gambling behavior as they function differently than a loss; a gambler's play may be altered and reinforced by near-misses as though they are wins (Habib & Dixon, 2010). Starting as a slot-machine phenomenon, a near-miss has been described as an outcome with matching symbols on a slot machine pay line with the final matching symbol just above or below the pay line (Dillen & Dixon, 2008; Dixon & Shreiber, 2004). Once the prevalence of the near-miss in slot machines had been observed, near-misses of various topographies have been observed in research on roulette play (Dixon, 2010), blackjack (Dixon et al., 2009), and it has been proposed to occur with scratch off tickets (Griffiths, 1999).

In an investigation of the near-miss in blackjack, Dixon and colleagues (2009) required participants to verbally rate each hand they played. The rating was placing a value (1-9) on the outcome of their hand (or score), highest value being closer to a win. The participants played 50 hands of blackjack and the results showed that when the participants' score was closer to the dealer score they rated their hand higher. When the participants did not bust they rated the losses higher than when they lost through a bust. Though a near-miss has been observed in blackjack, players in that study played alone which eliminates the many potential social

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variables such as additional comparisons between the players total and the totals of other players, attention-based reinforcement, and bet sizes and wins and losses of other players. In a casino, two or even up to five players are often playing at the same table, thus the external validity of such findings may be limited. Also, people may compare their hands to other players at the table, or players may more likely compare their hands to 21, the optimal outcome for a blackjack hand. For example, they might be only three points lower than the dealer, but several other players might have been closer, or losing to the dealer by a factor of two with a total of 16 might be different than losing by a factor of 2 with a total of 19. There is body of literature demonstrating effects of social variables such as group influence on risk taking behavior in Blackjack, and effects of ethnicity and group play on slot machine gambling (e.g., Blascovich & Ginsburg, 1974; see McDougall, Terrance, & Weatherly, 2011 for more detail discussion). Though these investigations demonstrated similarities in their findings (McDougall, McDonald, & Weatherly, 2008) no study demonstrated how adding players to a blackjack game could affect near-miss scores.

Because other comparisons may potentially predict the presence of a near-miss effect and because players often play in a social setting rather than alone, these variables must be included in an examination of the near-miss in blackjack to further our understanding of controlling contingencies in gambling games like Blackjack and to further understand the factors responsible for the near-miss in a more true gambling simulation as multiple gamblers are often playing at one table. Thus, the purpose of the current study was to replicate and extend the study by Dixon and colleges (2009) by investigating the effects of group play on near-misses demonstrated by players and compare them to near-misses when they would play with a dealer only, and to further examine the topography of the near-miss in blackjack. By adding group play to the current study the investigators aimed to measure whether there would be a difference in self-ratings on near-miss scores between lone play and group play conditions.

METHOD

Participants and Setting

Sixteen college students (15 female and 1 male), with ages ranging from 18 to 45 (M=23.8, SD=6.3) participated in the study for extra course credit. All participants completed the South Oaks Gambling Scale (SOGS; Lesiuer & Blume, 1987) to investigate whether they demonstrated tendencies towards pathological gambling. All scores indicated no evidence of pathological or problematic gambling and no participant was excluded from the study.

Sessions were conducted in two adjacent rooms in a university gambling laboratory. One room had a desk with a deck of cards and chips, a computer, and two chairs among other office materials such as computers and cabinets. The second room had a standard casino style blackjack table outfitted with cards, chips, four chairs and other gambling stimuli such as inactive slot machines, a roulette wheel, and a craps table. Approximately half of the individual sessions and half of the group sessions were conducted in either room to control for any differential effects of the setting.

Response Measurement and Interobserver Agreement

Following each hand of blackjack, participants recorded whether they won or lost, the score of the dealer, their own score, the score of the other player, and, their rating of closeness to a win. During gameplay participants were asked what their score was by the dealer, and were observed placing a

closeness to win rating on their data sheet. If they incorrectly stated their score the dealer corrected them and had them write the correct score down on the data sheet. If they did not rate their hand the dealer directed them to do so and observed them writing down their score. The closeness to win rating scale was the same as used by Dixon et al. (2009).

To ensure accuracy of observations, a second independent observer recorded player and dealer scores and win/loss outcomes on 50% of all hands played. Closeness to win ratings were copied by the experimenter and entered into a computer file after each session. A second experimenter independently entered the ratings for closeness to win ratings to assess the reliability. Reliability was calculated as the number of agreements divided by the number of agreements plus disagreements, multiplied by 100%. Reliability for closeness to win ratings was 100%, 100% for lone play condition scores, 100% for group play condition scores, and 100% for win and loss scores.

Procedure

After consenting to participate and completing the SOGS, participants then played blackjack in two different conditions. In the first condition, participants played 25 hands as the only player against the dealer (lone condition). The second condition required 25 additional hands of blackjack against the dealer, but alongside another participant or confederate (group condition). To control for possible sequence effects, participants were randomly assigned to the two possible condition sequences. Of the 16 participants in the study, nine started playing in the lone condition and proceeded to the group condition, and the remaining seven completed the conditions in reverse order.

After condition sequences were decided, the experimenter provided the following instructions:

> "*The game we are about to play is called blackjack and consists of trying to get a score of 21 to win. You will get 245 credits in chips that you will use to wager. Your aim is to end the game with more chips than you started with. We will start by dealing to you two cards and I (dealer) will also have two cards. Then you can look at your cards but you will only see one of my cards. When you look at your cards you will have to assess how good your hand is and place a bet. After you place the bet you can ask for another card or you can stay with the cards your got. You can ask for as many cards you need to win. You can make an additional bet if your hand improved from receiving another card. When you decide to stay I will flip over my second card and I will place cards down until I reach 17 or higher. If you win you will get the amount you bet, if I win you will lose that amount. You will not be allowed to double-down or split*."

None of the participants indicated that they were advanced players at blackjack. All participants were allowed to play 3 to 5 practice hands without betting, to facilitate gameplay and to verify that they understood the rules. After practicing the experimenter gave the following instructions to participants starting in the lone play condition:

> "*We are going to play 25 hands and then another player is going to join us for another 25 hands. The only change that occurs when the other player joins us is that you have to write down his score as well. Any questions?"*

Instruction for participants starting in the group play condition were:

> "*We are going to play 25 hands and then one of you is going to go with another experimenter to play another 25 hands against a dealer only. Any questions?*"

If there were any questions made by the participants the experimenter answered them by referring to the relevant portion of the instructions. Whenever the experimenter observed the participants fail to record scores and/or rate the closeness to win, the dealer paused the game and prompted participants to complete their data collection.

RESULTS AND DISCUSSION

In the lone play condition participants lost on average 45% of all hands played, and in the group play condition they lost 63.5% of all hands played. This difference was significant $t(15) = -5.381$, $p < .001$. In the lone play condition, 4 out of 16 participants won more hands than they lost, and in the group play condition no participant won more hands than they lost. Pushes (not a win or a loss) accounted for 15% and 10.5% of all hands played in the lone play and group play conditions, respectively. Similar to Dixon et al. (2009), a "bust loss" occurred when a participant had a cumulative score of 22 or higher, and a "no-bust loss" was when the participant had a cumulative score of 20 or less, but his or her total was less than that of the dealer. The top and middle panel of Figure 1 display mean closeness to win ratings across all participants in the lone and group play conditions, respectively, of the player's hand from 21, dealer's distance from 21, (middle panel; group play) for non-bust losses only. The final panel of Figure 1 displays closeness to win ratings as a function of the difference of the other player's distance from 21.

A hierarchical regression analysis was carried out to assess predictors of closeness to win ratings (Tables 1 and 2). Two models were utilized, including distance of player´s, dealers, and other player´s hand from 21, as predictor variables in the first model. In the second model, distance between player´s, dealer, and other player´s hands were added to analysis. Distance was defined as the numerical distance from the player's (i.e., 15) and dealer´s hand (i.e., 18). The general procedure was to test the distance from 21 of the player, dealer and other player first, then add distance between hands to assess their added contribution to the predictive variance.

Significant correlations of the variables are shown in Table 1 and regression coefficients in Table 2. The first prediction model was statistically significant, $F(3, 12) = 6.063$, $p = .009$, and accounted for approximately 60% of the variance of closeness to win ratings ($R^2 = .602$, Adjusted $R^2 = .503$). Closeness-to-win ratings were primarily predicted by participant distance from 21 and second player distance from 21, and not by dealer distance from 21. The second prediction model was not significant $F(5, 10) = 3.055$, $p = .063$. The second model analysis was conducted to replicate the findings of Dixon and colleges (2009) by using similar measures, that is distance from dealer´s hand. The results did not indicate that there was an added prediction value by these three variables.

In summary, the presence of another player influenced the participant's closeness to win ratings but the dealer´s distance from 21 did not. The data displayed in the top and bottom panel of Figure 1 show a relationship in closeness to win rating as the difference between hand total and 21 increases for player and the other player respectively. Conversely, participants did not systematically differentiate ratings based on the difference between their total and the dealer´s

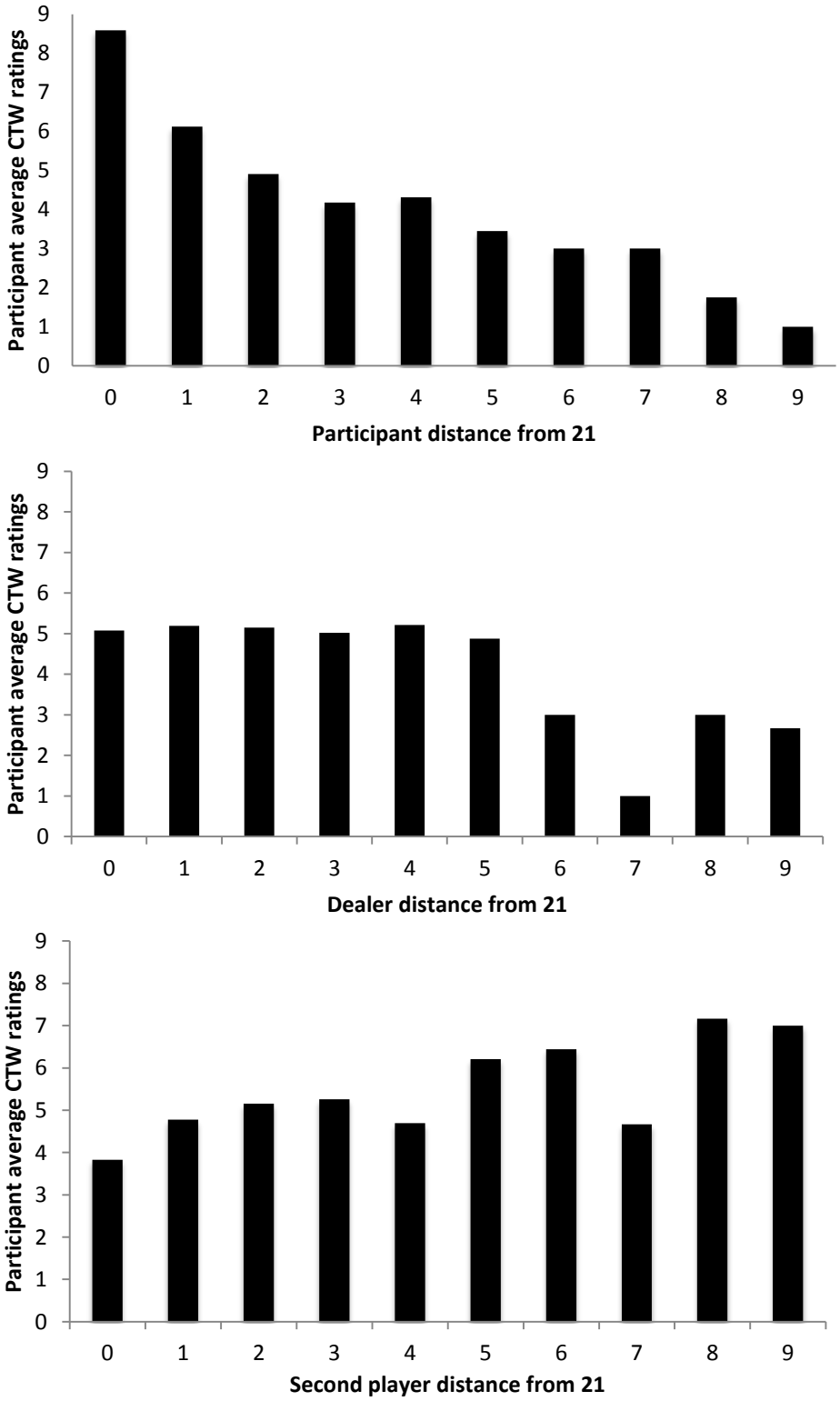

Figure 1. Closeness to win scores across comparisons. All three panels display mean closeness to win ratings in non-bust losses for lone play and group conditions.

Table 1. Correlations of the variables in the regression analysis ($N = 16$)

	Closeness to win	Player difference from 21	Dealer difference from 21	Other player difference from 21	Player difference from dealer	Player difference from other player
Closeness to win	-	-.649**	.046	.647**	-.587**	-.040
Player difference from 21		-	-.106	-.456*	.642**	.179
Dealer difference from 21			-	.149	.414	-.218
Other player difference from 21				-	-.471*	.089
Player difference from dealer					-	-.112
Player difference from other player						-

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2. Regression coefficients from the regression models

		b	*SE b*	*ß*
Model 1	(Constant)	6.163	2.914	
	Player difference from 21	-1.382	.623	-0.454*
	Dealer difference from 21	-.443	.501	-0.163
	Other player difference from 21	1.380	.613	0.464*
Model 2	(Constant)	6.723	4.148	
	Player difference from 21	-1.275	.971	-0.419
	Dealer difference from 21	-.410	.758	-0.151
	Other player difference from 21	1.375	.750	0.462
	Player difference from dealer	-.084	.750	-0.042
	Player difference from other player	-.186	.929	-0.043

*. $p < 0.05$

total in either condition. Similarly, there was not an observed difference in closeness to win scores when they busted as compared to when they did not bust.

Overall, the results support the previous research on the blackjack near-miss in that an effect was observed for non-bust losses (Dixon et al., 2009) and extended those findings with the inclusion of an additional player at the table, which may more closely represent the social aspects of blackjack in a casino environment. Further, the authors included an analysis different from Dixon and colleges where they investigated distance between player and dealer total score and how that affected closeness to win ratings. The current study investigated the effects of player´s and other player´s hands from 21 and analyzed how this distance affected closeness to win ratings. Previous research observed differentiated ratings as a function of the difference between the dealer's total and the player's total (Dixon et al., 2009). Statistical analysis of the present re-

sults suggests that the difference to 21 may exert more control over closeness to win ratings, a similar result as that of Dixon (2010), who found ratings in roulette were controlled by numerical proximity between the number bet and the outcome. However, these measures are not always necessarily independent. For instance, on a non-bust loss, a hand with a value of 17 is relatively close to 21, but hands of this value will also closely approximate the dealer's total because the dealer must possess a value between 17 to 21 to win. Because the dealer is required to continue taking cards until s/he reaches a total of 17 in standard casino play, many non-bust losses will occur within a range close to 21 and close to the dealer's hand. Future research in this line may wish to systematically isolate each of these variables with rigged hands or computerization to more completely determine the influence of each comparison.

Along with random variation inherent in the game, the results are also limited due to uncontrolled winnings and the frequency of particular outcomes. In the current study, participants lost an average of almost 20% more hands in the group condition than in the lone condition. Also, near-misses have been reported to maintain game play by gamblers, specifically when playing slot-machines, if the near-misses are frequent, but may not maintain play when they are overly frequent (MacLin, Dixon, Daugherty, & Small, 2007). Again, future research may wish to control such variation or to further examine the influence of frequent losses or frequent wins on the near-miss effect. Other limitations were related to the sample and the game used. In the current study 15 out of the 16 participants were females and the Blackjack game used in the current study was not a common version of the game. It was an adapted version that was originally used by Dixon and colleagues (2009) where there were no doubles, no splits and instructions to the participants were kept the same. Due to the nature of the study being a replication, the authors decided to use a similar game for the purposes of replication and to facilitate comparison between the two studies. The results of the current study must also be interpreted with care because the researchers were unable to maintain equal gender participation. Future research on the near-miss effect across different games of chance may be valuable in determining the development of the effect and suggest more effective treatments for problem gamblers. In slot machines, for example, near-miss outcomes are formally similar to wins, so generalization may influence the effect. However, the present results and those of Dixon (2010) that showed numerical proximity influenced participants' ratings of outcomes in blackjack and roulette, respectively, suggest that other factors may be more relevant as visual similarity of winning outcomes is not necessary to produce higher closeness to win ratings in these games. As many games appear to have a unique arrangement that produces the near-miss effect, a further analysis of these arrangements in different games of chance may find common environmental characteristics or sources of control suggestive of underlying causes of the effect so that these variables can be directly targeted in treatment.

In sum, the current study replicated and extended a study by Dixon et al. (2009) and added implications to the body of literature on near-misses. By further investigating the characteristics of near-misses we take one step forward on the path to discover the complex controlling contingencies of gambling behavior, and by successfully replicating and extending previous research this path may become easier to follow by future researchers.

REFERENCES

Blascovich, J., Ginsburg, G. P., & Howe, R. C. (1975). Blackjack and the risky shift: II. Monetary stakes. *Journal of Experimental Social Psychology, 11*, 224–232.

Dillen, J., & Dixon, M. R. (2008). The impact of jackpot and near-miss magnitude on rate and subjective probability of slot machine gamblers. *Analysis of Gambling Behavior, 2*, 121-134.

Dixon, M. R. (2010). The roulette near-miss effect. *Analysis of Gambling Behavior, 4*, 54- 60.

Dixon, M. R., Nastally, B. L., Hahs, A. D., Horner-King, M., & Jackson, J. W. (2009). Blackjack players demonstrate the near-miss effect. *Analysis of Gambling Behavior, 3*, 56-61.

Dixon, M. R., & Schreiber, J. E. (2004). Near-miss effects on response latencies and win estimations of slot machine plays. *Psychological Record, 54*, 335-348.

Griffiths, M. (1999). Gambling technologies: Prospects for problem gambling. *Journal of Gambling Studies, 15,* 265-283.

Habib, R. & Dixon, M.R. (2010). Neurobehavioral evidence for the "near-miss" effect in pathological gamblers. *Journal of the Experimental Analysis of Behavior, 93*, 313-328.

Lesieur, H. R., & Blume, S. B. (1987). The south oaks gambling screen (SOGS): A new instrument for the identification of pathological gamblers. *American Journal of Psychiatry, 144,* 1184-1188.

MacLin, O. H., Dixon, M. R., Daugherty, D., & Small, S. L. (2007). Using a computer simulation of three slot machines to investigate a gambler's preference among varying densities of near-miss alternatives. *Behavior Research Methods, Instruments, and Computers, 39*, 237–241.

McDougall, C. L., McDonald, J. D., & Weatherly, J. N. (2007). The gambling behavior of American Indian and non-Indian participants: effects of the actions and ethnicity of a confederate. *American Indian & Alaska Native Mental Health Research: The Journal of the National Center*, *14*, 59-74.

McDougall, C. L., Terrance, C., & Weatherly, J. N. (2011). The effect of male confederate presence, betting, and accuracy of play on males´ gambling on blackjack. *Psychological Record*, *61*, 411-424.

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