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ORIGINAL PAPER

Power and Gambling: Dispositional Power Predicts Persistence on a Computerized Scratchcard Task

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Abstract
In gambling contexts, near-misses tend to be perceived as more aversive yet elicit greater motivation to continue playing than clear losses. The current research aimed to examine these effects in the context of situational and dispositional social power. In a pre-registered online study, Hong Kong Chinese undergraduate students ($N = 238$) with varying levels of gambling involvement completed a measure assessing their general beliefs about their ability to influence others and were then randomly assigned to imagine themselves in a position of high or low power. Participants subsequently played a computerized scratchcard task that delivered wins, near-misses, and clear losses and took trial-by-trial ratings of valence, arousal, and motivation. Following a mandatory phase, persistence was measured via the number of additional scratchcards participants chose to purchase. The results generally corroborated previous findings of different subjective appraisals to near-misses vs. clear losses, but surprisingly found that near-misses were considered to be more pleasant than clear losses. Situational power did not differentially modify these responses. Nevertheless, a main effect of dispositional power emerged in that participants who felt chronically high in power were twice as likely to purchase additional scratchcards compared to their low dispositional power counterparts. This study suggests that a generalized sense of power but not situational power triggers approach motivation in the form of prolonged gambling play.

Keywords Power · Gambling · Scratchcards · Near-misses

Introduction

A notable structural characteristic found within all forms of gambling is the occurrence of near-misses, objectively unsuccessful outcomes that come close to reaching the goal (Reid, 1986). For example, on a scratchcard, a near-miss would describe a situation in which

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three matching symbols are needed to win, but the player ends up with only two such symbols. Despite near-misses and clear losses being objectively equivalent outcomes that both involve the loss of one's bet, they elicit different cognitive, emotional, and behavioral responses (for a review, see Barton et al., 2017). Studies on slot machine gambling (Clark et al., 2009, 2012, 2013) and scratchcard gambling (Stange et al., 2016, 2017a, b) have both reported that relative to clear losses, near-misses are rated as more aversive, arousing, frustrating, and disappointing, yet elicit increased motivation to continue playing. Near-misses also foster gambling persistence, increasing the number of games played especially when they occur at moderate frequencies of around 30% (Côté et al., 2003; Kassinove & Schare, 2001). Such effects may occur because near-misses activate the mesolimbic dopaminergic system (Clark et al., 2009), which is primarily involved in the motivational "wanting" of desired rewards and less so in hedonic "liking" (Berridge, 2007). However, while most research has focused on the *effects* of near-misses, less attention has been paid to investigating moderators thereof.[1] Given that gambling behavior, such as responses to different outcomes, is influenced by a myriad of factors that vary between players (Abbott, 2007; Toneatto & Nyugen, 2007), it is important to consider moderators to improve understanding of the conditions under which the effects of near-misses may be magnified or diminished. The current research examines the moderating role of social power, the asymmetric capacity to provide or withhold valued material or social resources (e.g., money, food, affection, knowledge) in social relationships (Guinote, 2017; Keltner et al., 2003).

It is expected that social power may possibly moderate, and specifically amplify, the effects of near-misses. Power is believed to activate the behavioral approach system (BAS; Guinote, 2017; Keltner et al., 2003), a regulatory system that manages behavior oriented toward approaching desired outcomes and is thought to involve dopaminergic pathways (Gray, 1990). Some theories explicitly highlight the link between power and approach motivation. For example, the approach-inhibition theory of power (Keltner et al., 2003) suggests that elevated power triggers approach-related tendencies because power holders typically have access to abundant resources and are less restricted by social evaluation or consequences. Similarly, the theory of power as activating, wanting, and goal seeking (Guinote, 2017) posits that activation of the BAS in power holders is associated with the pursuit of salient goals (e.g., those related to power roles, dispositions, or the task at hand), energizing individuals in their thoughts and actions and intensifying the drive to work toward those goals.

Experimental studies have also provided some convincing evidence for the power-approach link. Relative to their powerless counterparts, power holders display behavioral disinhibition (Guinote, 2010; Keltner et al., 2003; Lammers & Maner, 2016; Lammers et al., 2011), a greater tendency to take action (Galinsky et al., 2003; Magee et al., 2007), goal-consistent behavior (Guinote, 2007; Guinote & Ong, 2012), optimism and risk-taking (Anderson & Galinsky, 2006), reduced loss aversion (Inesi, 2010), and an inflated sense of illusory control (Fast et al., 2009). These approach-related effects of power inform the current investigation of whether power amplifies responses to gambling near-misses, given that gambling involves taking action under risk to attain the salient goal of maximizing

[1] As exceptions, some research shows that responses toward near-misses (e.g., amount of persistence) can be moderated by situational factors such as the frequency of near-miss delivery (Côté et al., 2003) and sad mood (Devos et al., 2018), as well as by dispositional factors such as trait susceptibility to gambling cognitions (Billieux et al., 2012), trait optimism and pessimism (Xia et al., 2018), and the capacity for response inhibition (Devos et al., 2015).

one's earnings. Dixon et al. (2011) have suggested that during the occurrence of near-misses, which constitute an obstacle for goal pursuit, the BAS may respond by inducing greater effort and gambling persistence in some individuals. Along this line of thinking, it is plausible that under conditions of elevated power in which the BAS is activated, the aversive, arousing, and invigorating properties of near-misses may be enhanced, relative to under conditions of powerlessness.

It is important to note here that power is multi-faceted rather than monolithic. According to the interpersonal power and behavior model (Schmid Mast, 2010), different facets of power (e.g., dispositional power, structural power, competence) can all influence how powerful individuals feel in a given situation and consequently moderate the link between power and behavior. Consistent with this idea, research has demonstrated joint effects of situational and dispositional power, such that there was an increased tendency for self-expression when participants' assigned power role matched (vs. did not match) their inherent beliefs about their ability to influence others (Chen et al., 2009). Thus, in addition to considering the effects of situational power (as induced via an experimental manipulation), the current study also measured dispositional power (as defined by individuals' beliefs about their power in general) to examine whether dispositional power may enhance or otherwise interact with the effects of the power manipulation.[2]

The purpose of the current research was twofold. First, it aimed to replicate previous findings of differential responses to near-misses relative to clear losses in terms of valence, arousal, and motivation, in a sample of Hong Kong Chinese undergraduate students. This replication was considered important as there has been little research related to gambling cognitions and behavior in this population (Wong et al., 2022), especially research of an experimental nature, despite the widespread nature of gambling in Hong Kong Chinese young adults—the most recent prevalence study in 2016 indicated that the gambling prevalence rate of young people was 45.60% (Hong Kong Polytechnic University, 2017). To achieve the first aim, the current study used a computerized scratchcard task based on the paradigm developed by Stange and colleagues (Stange et al., 2016, 2017a, b) that delivered wins, near-misses, and clear losses and took ratings of valence, arousal, and motivation on a trial-by-trial basis. This particular task was chosen as the target population is more likely to have experience with scratchcards compared with other forms of gambling (e.g., slot machines).

The second aim was to investigate whether social power would play a moderating role in relation to near-miss responses (i.e., valence, arousal, motivation) and influence gambling persistence. Situational power was manipulated using an imaginary role task (Dubois et al., 2010), while dispositional power was assessed using the Personal Sense of Power Scale (Anderson et al., 2012). Based on the literature reviewed above, the following hypotheses were advanced:

[2] Following Chen et al.'s (2009) approach, this paper examines dispositional power in terms of a generalized sense of power, although it should be noted that there are other dispositions associated with power, such as trait dominance. The difference between these two types of power-related dispositions is that dominance involves a desire to influence and prevail over others, which is often enacted through assertive and forceful means (Guinote & Chen, 2018), while the generalized sense of power has more to do with perceptions of one's own influence, regardless of one's actual level of control over resources (Anderson et al., 2012).

Hypothesis 1 Near-misses on a scratchcard task will be rated as more negative in valence (**H1a**), more arousing (**H1b**), and as eliciting greater motivation to continue playing (**H1c**) relative to clear losses.

Hypothesis 2 In the high situational power condition, the differences between near-misses and clear losses in terms of valence (**H2a**), arousal (**H2b**), and motivation to continue playing (**H2c**) will be magnified relative to the low situational power condition. In addition, participants in the high situational power condition will demonstrate greater persistence than counterparts in the low situational power condition (**H2d**).

The remaining hypotheses, regarding joint effects of situational and dispositional power, are more exploratory, with no specific predictions about the pattern of effects:

Hypothesis 3 There may be interactions between situational and dispositional power for valence (**H3a**), arousal (**H3b**), motivation to continue playing (**H3c**), and persistence (**H3d**).

The hypotheses, sample size, measures, and data analysis plan of the current study were pre-registered in advance of data collection (https://aspredicted.org/my9ax.pdf).

Method

Participants

An a priori power analysis performed in G*Power (Faul et al., 2007) using an α level of 0.05, power level of 0.90, and effect size of $f = 0.19$ (based on Chen et al., 2009) indicated a minimum required sample size of 196. Based on this estimate, a sample size of 216 was pre-registered to account for potential exclusions. However, during data collection, it became apparent that more participants would have to be excluded than originally expected due to failure to follow instructions (e.g., not completing the entire study in one sitting, not paying attention, providing written responses unrelated to power); thus, data collection continued even after the aforementioned sample size had been reached. In the end, data were collected from 301 undergraduate students at The Chinese University of Hong Kong; these students were enrolled in general psychology courses and were recruited from the psychology subject pool at the time of testing. Participants were awarded course credit along with a bonus contingent on their earnings on the scratchcard task (up to $10 HKD, which is equivalent to $1.27 USD).

The reported analyses are based on a final sample of 238 participants, with 63 participants excluded due to one or more of the following reasons: partial completion of the study ($n = 2$), invalid responses on the power manipulation task ($n = 6$), technical issues with the scratchcard task ($n = 3$), failing at least one attention check ($n = 47$), and taking an unusually long time to complete the scratchcard task and/or entire study (more than three standard deviations away from the mean; $n = 6$). Among participants in the final sample, the mean age was 18.96 years ($SD = 1.43$, range: 17–25). The sample consisted of 78 males (32.77%), 158 females (66.39%), and two participants who did not identify as either male or female (0.84%). In terms of gambling involvement, scores on the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) ranged from 0 to 18 ($M = 1.49$, $SD = 2.72$).

According to the cut-offs for this measure, 141 participants (59.24%) did not engage in gambling at all or were non-problematic gamblers (PSGI = 0), 46 participants (19.33%) had low levels of gambling problems (PGSI = 1–2), 39 participants (16.39%) had moderate levels of gambling problems (PGSI = 3–7), and 12 participants (5.04%) were problem gamblers (PGSI ≥ 8).

Informed consent was obtained from all participants prior to the study, including parental consent for participants who had not yet turned 18. The experimental protocol was approved by the Survey and Behavioral Research Ethics Committee at The Chinese University of Hong Kong.

Design

The study used a 2 (situational power: high, low; *between-subjects*) × 2 (dispositional power: high, low; *between-subjects*) × 3 (outcome: win, near-miss, clear loss; *within-subjects*) mixed design. The dependent variables were valence toward outcomes, arousal toward outcomes, motivation to continue playing after outcomes, and persistence.

Materials

Personal Sense of Power Scale

The Personal Sense of Power Scale (Anderson et al., 2012) was administered to assess participants' level of dispositional power. Participants were asked to rate the extent to which they agreed with eight statements about their ability to influence others in general (e.g., "In my relationships with others, I can get them to listen to what I say") on a 7-point scale (1 = *disagree strongly*, 7 = *agree strongly*). After reverse coding the appropriate items, a dispositional power composite score was created from the average of the eight items ($\alpha = 0.82$, $M = 4.69$, $SD = 0.82$). As pre-registered, to analyze this variable as a categorical factor, a median split was performed ($Mdn = 4.88$), dividing the sample into a high dispositional power group ($M = 5.40$, $n = 106$) and low dispositional power group ($M = 4.12$, $n = 132$).

Imaginary Role Task

Situational power was manipulated using an imaginary role task (Dubois et al., 2010) that has reliably produced relevant changes in cognition and behavior in past research. Participants were randomly assigned to imagine themselves as either a boss in charge of directing subordinates (high situational power condition; $n = 122$) or an employee responsible for carrying out the orders of the boss (low situational power condition; $n = 116$), and then type an essay describing a day in this role. The minimum response length was set to 300 characters to increase the likelihood that the role was imagined in enough detail for the concept of power to be properly activated.

A pilot study was conducted with 36 members of the target population to test the effectiveness of this power manipulation. Specifically, after completing the imaginary role task, participants were asked to complete seven semantic differential items on a 7-point scale regarding how they currently felt (with the items of key interest for the manipulation check being *not powerful—powerful*, *uncertain—certain*, *weak—strong*, *not in control—in control*, and *doubtful—confident*). A manipulation check composite score was created from the average of the five key items ($\alpha = 0.88$). The results indicated that the task

was effective in eliciting differences in sense of power between the high situational power condition ($M = 4.59$, $SD = 0.96$) and low situational power condition ($M = 3.85$, $SD = 1.14$), $F(1, 34) = 4.29$, $p = 0.046$, $\eta^2_p = 0.112$. Given these results, a manipulation check was not included in the current study, based on Hauser et al.'s (2018) suggestion that manipulation checks, especially salient ones that ask participants how they feel, may act as unintended additional interventions.

BIS/BAS Scales

Although this variable was not pre-registered, state BAS activation was measured using four items from the BAS Drive subscale of the BIS/BAS scales (Carver & White, 1994) as an exploratory variable that may potentially explain any significant effects of situational power (1 = *very true for me*, 4 = *very false for me*). Two items from the BIS subscale were also included as filler items but were not used in any of the analyses. As the original BIS/BAS scales assess trait tendencies, the six items were slightly reworded such that they asked about participants' current state (following Lammers et al., 2008; $\alpha_{\text{BAS Drive}} = 0.65$; $\alpha_{\text{BIS}} = 0.20$).

Scratchcard Task

A computerized scratchcard task, programmed using JavaScript, was created based on the paradigm developed by Stange and colleagues (Stange et al., 2016, 2017a, b). Each participant played two mandatory scratchcards (henceforth referred to as Card A and Card B) that they could select from among approximately 100 cards displayed in two stacks (see Fig. 1a). Each card contained three games represented by gray boxes. Wins were indicated by three matching symbols among a total of six symbols. Near-misses were indicated by only two matching symbols, interspersed among four non-matching symbols. Clear losses were indicated by six non-matching symbols. Card A delivered a loss, a win ($10 HKD), and another loss, while Card B delivered a loss, a near-miss, and another loss. The two cards were presented in a randomized order. On any particular card, participants could select the order in which they scratched the three games, but the task was programmed such that the outcomes would always be delivered in a consistent sequence for all participants (i.e., Card A: loss, win, loss; Card B: loss, near-miss, loss). The aforementioned selection features were implemented to reduce feelings of unnaturalness and more importantly, to provide elements of perceived personal control, which has been found to be important for eliciting the motivational effects of near-misses (Clark et al., 2009, 2012; Porchet et al., 2013).

To scratch each game, participants were to hold down and drag their mouse over the corresponding box, similar to online scratchcard games (see Fig. 1b). The task was programmed such that after participants had uncovered at least 65% of a box, the undersurface would automatically be revealed and that corresponding game counted as complete. Approximately 1.5 s after the reveal of each outcome, participants were asked to provide subjective ratings of the outcome in terms of valence, arousal, and motivation to continue playing via a popup window at the bottom of the screen. Valence and arousal were assessed using the pleasure and arousal dimensions of the Self-Assessment Manikin (SAM, 5-point version; Bradley & Lang, 1994), respectively. For the rating of valence, participants were shown a series of cartoon characters, ranging from a happy figure to an unhappy figure, and were asked to choose one of the figures in response to the question, "How positive or

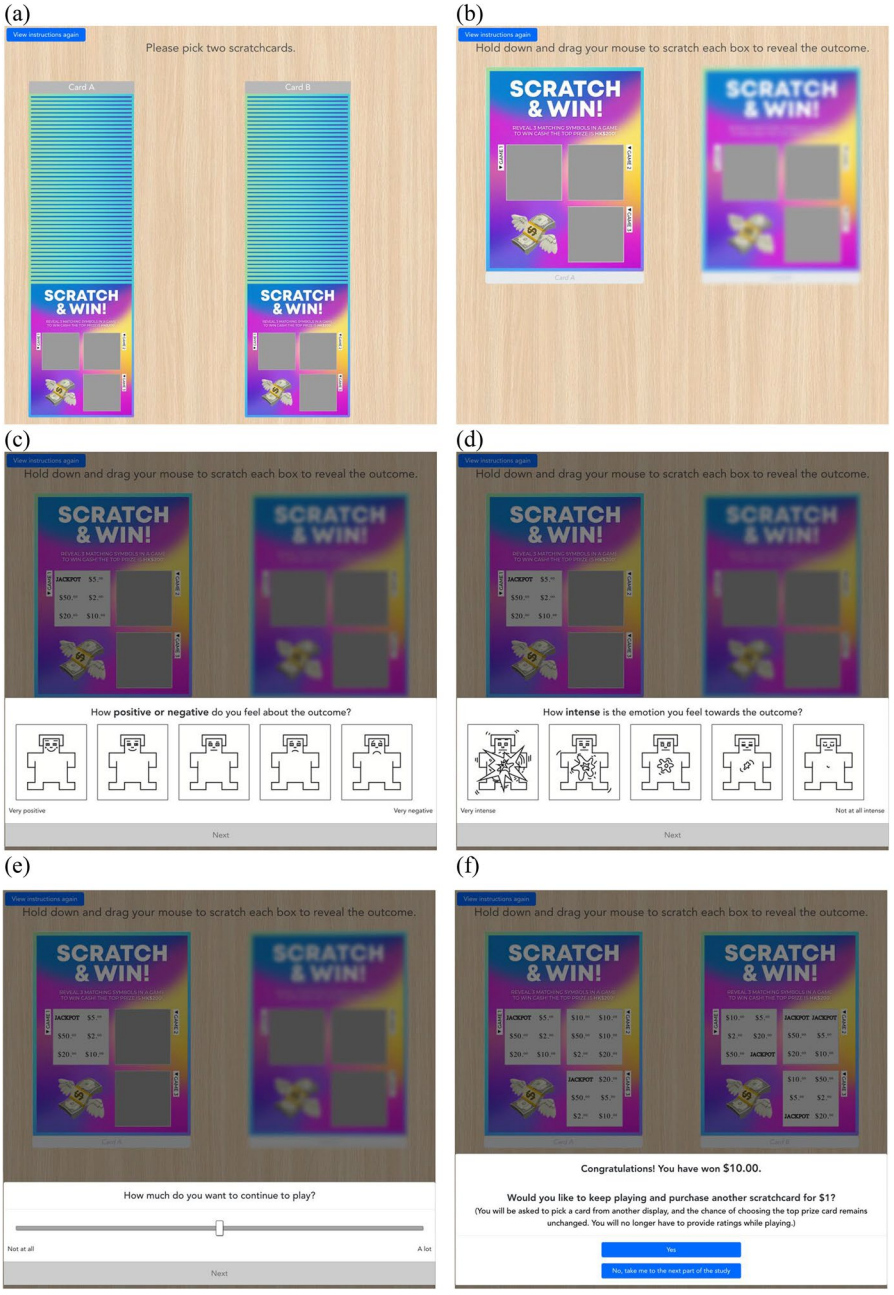

Fig. 1 Screen displays of the computerized scratchcard task when **a** selecting Card A and Card B, **b** scratching each game on a card, **c** completing the rating of valence after each outcome, **d** completing the rating of arousal after each outcome, **e** completing the rating of motivation after each outcome, and **f** entering the persistence phase where participants could use their winnings to purchase additional scratchcards

negative do you feel about the outcome?" (1 = *very negative*, 5 = *very positive*; see Fig. 1c). For the rating of arousal, another series of cartoon characters was shown, ranging from an excited figure to a relaxed figure; participants were asked to choose one in response to the question, "How intense is the emotion you feel towards the outcome?" (1 = *not at all intense*, 5 = *very intense*; see Fig. 1d). Motivation to continue playing was assessed using the question, "How much do you want to continue to play?", with responses given on a sliding scale (0 = *not at all*, 100 = *a lot*; see Fig. 1e).

After completing the two scratchcards, another popup window appeared informing participants of their current winnings ($10) and asking if they wished to purchase additional scratchcards to keep playing, with each costing $1 (see Fig. 1f). These additional scratchcards only delivered loss outcomes and no further ratings were taken. Participants could continue to purchase additional scratchcards up to 10 times until they used up their winnings or opted to proceed to the next part of the study. The number of additional scratchcards purchased (ranging from 0 to 10) served as the measure of persistence.

Problem Gambling Severity Index

The PGSI (Ferris & Wynne, 2001), a well-validated index of problem gambling severity in the general population, was administered as a measure of gambling involvement to test this variable as a potential covariate. Participants responded to nine items on a 4-point scale (0 = *never*, 3 = *almost always*; $\alpha = 0.83$).

Gambling Related Cognitions Scale

Gambling-related cognitions were measured using the Gambling Related Cognitions Scale (GRCS; Raylu & Oei, 2004) to test as a potential covariate. The scale consists of five subscales (gambling expectancies, illusion of control, predictive control, inability to stop gambling, and interpretive bias) and a total of 23 items (1 = *strongly disagree*, 7 = *strongly agree*). Both the total score and subscale scores were considered when this variable was analyzed ($\alpha_{total} = 0.90$; $\alpha_{gambling\ expectancies} = 0.82$; $\alpha_{illusion\ of\ control} = 0.77$; $\alpha_{predictive\ control} = 0.70$; $\alpha_{inability\ to\ stop\ gambling} = 0.74$; $\alpha_{interpretive\ bias} = 0.75$).

Procedure

The entire study was administered online via Qualtrics. In order to reduce suspicion about the purpose of including seemingly unrelated tasks (i.e., the imaginary role task and scratchcard task), participants were told that the current research project consisted of two separate studies. Following the obtainment of informed consent, participants were directed to "Study 1", which was ostensibly investigating the relationship between people's individual/interpersonal characteristics and their writing styles in an imaginary role task. During this part of the study, participants completed the Personal Sense of Power Scale, the imaginary role task, and the BIS/BAS scales.

Upon completion of "Study 1", participants were subsequently directed to "Study 2", which was ostensibly about how people's subjective reactions during a scratchcard game were related to their involvement in and cognitions about gambling. During this part of the study, participants completed the scratchcard task, PGSI, and GRCS. The scratchcard task was embedded in the questionnaire and could be enlarged to fill the entire screen. Participants first received instructions on how the task worked. They were

informed that their goal was to uncover three matching symbols within any one game on a card, after which participants could earn the corresponding amount in cash. The instructions included visual examples of each type of outcome (win, near-miss, loss), but referred to the near-miss example as a "loss" instead of using the term "near-miss" explicitly. Participants were told that they would be selecting two scratchcards from a display containing approximately 100 cards, and that one of these cards was the top prize winning card where uncovering three "JACKPOT" symbols would reward them with $200 HKD (equivalent to $25.49 USD). Participants were told that if they won any money from the first two cards, they could then either use these winnings to purchase additional cards or proceed to the next part of the study. After starting the task, participants were able to re-view the instructions at any time by pressing a button labeled "View instructions again" in the top left corner.

After the completion of "Study 2", demographic measures (age, gender, education level, monthly household income, parents' occupations) were administered. Finally, participants were debriefed and thanked for their participation.

Analysis Strategy

During pre-registration, it was decided that demographic characteristics (age, gender, education level, household income, parents' occupations) and gambling-related variables (gambling involvement, gambling-related cognitions) would be included as covariates only if they both differed across conditions and correlated with any of the outcome measures. Given that none of the aforementioned variables fulfilled this criterion, they were not considered in further analyses.

As pre-registered, data points that were at least three standard deviations from the mean, if any, were considered as outliers and removed in each analysis. In addition, given that participants experienced four clear losses compared to one win and one near-miss, clear losses were treated in two ways in the analyses related to valence, arousal, and motivation. First, the subjective ratings averaged across the four clear losses were analyzed. Second, only the rating corresponding to the first clear loss on the second scratchcard was analyzed, such that for all outcome types, the preceding outcome was a clear loss (following Stange et al., 2017a). However, as the pattern of results was generally similar across both sets of analyses, this paper reports the results from the first type of analysis. In analyses where the sphericity assumption was violated, the Greenhouse–Geisser correction was applied, and the Bonferroni correction was applied where multiple comparisons were made.

Results

Differences Between Conditions

Independent samples *t*-tests and chi-square tests were used to compare the high and low situational power conditions on dispositional power, demographics, and gambling-related variables (see Table 1). There were no significant differences for any of the variables,

Table 1 Descriptive statistics and group comparisons for the high and low situational power conditions regarding dispositional power, demographics, and gambling-related variables

	High situational power ($n = 122$)		Low situational power ($n = 116$)		Statistical test
	M / N	*SD / %*	*M / N*	*SD / %*	
Dispositional power	4.73	0.90	4.66	0.74	$p = .538$
Age	19.13	1.41	18.78	1.42	$p = .054$
Gender					$p = .101$
Male	46	37.70%	32	27.59%	
Female	76	62.30%	82	70.69%	
Other	0	0%	2	1.72%	
Educational level	13.05	2.87	13.03	2.60	$p = .946$
Monthly household income					$p = .344$
Less than $3,000	14	11.48%	11	9.48%	
$3,000–13,999	16	13.11%	10	8.62%	
$14,000–29,999	35	28.69%	27	23.28%	
$30,000–99,999	46	37.70%	50	43.10%	
$100,000 or above	11	9.02%	18	15.52%	
Father's occupation					$p = .828$
Professional/manager/executive	32	26.23%	29	25%	
Other	90	73.77%	87	75%	
Mother's occupation					$p = .725$
Professional/manager/executive	21	17.21%	22	18.97%	
Other	101	82.79%	94	81.03%	
PGSI	1.43	2.36	1.55	3.06	$p = .723$
GRCS					
Total	62.55	21.33	61.01	19.64	$p = .563$
Gambling expectancies	2.67	1.28	2.48	1.18	$p = .226$
Illusion of control	2.59	1.22	2.59	1.22	$p = .991$
Predictive control	3.14	1.07	3.12	1.03	$p = .850$
Inability to stop gambling	1.90	0.94	1.81	0.90	$p = .429$
Interpretive bias	3.29	1.39	3.26	1.30	$p = .853$

suggesting that random assignment was successful in evenly distributing characteristics of the sample between experimental conditions.

Subjective Ratings of Valence

To test the hypotheses regarding valence (H1a, H2a, and H3a), the valence scores were submitted to a 2 (situational power: high, low) × 2 (dispositional power: high, low) × 3 (outcome: win, near-miss, clear loss) mixed-model analysis of variance (ANOVA), with repeated measures on outcome. Eight participants were excluded from this analysis due to having outlying data for one or more outcome types.

H1a, which predicted that near-misses would be rated as more negative in valence than clear losses, was not supported. There was a significant main effect of outcome,

Table 2 Descriptive statistics for the high and low situational power conditions regarding the scratchcard task variables

	High situational power ($n=122$)		Low situational power ($n=116$)		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
Valence[a]						
Wins	3.91	0.78	4.03	0.69	3.97	0.74
Near-misses	2.86	0.96	2.75	1.09	2.80	1.02
Clear losses	2.63	0.62	2.66	0.69	2.64	0.65
Arousal						
Wins	2.57	1.13	2.39	1.09	2.48	1.11
Near-misses	2.46	1.14	2.36	1.13	2.41	1.14
Clear losses	2.20	0.84	2.01	0.83	2.11	0.84
Motivation						
Wins	67.73	23.81	70.22	25.98	68.95	24.87
Near-misses	62.67	26.68	63.36	27.81	63.01	27.18
Clear losses	58.43	23.92	59.30	24.84	58.85	24.33
Persistence	3.69	4.41	2.96	4.24	3.33	4.33

[a]Eight participants were excluded for this variable due to having outlying data (high situational power $n=119$, low situational power $n=111$)

$F(1.50, 339.62)=200.25$, $p<0.001$, $\eta^2_p=0.470$, but contrary to expectations, near-misses ($M=2.80$, $SD=1.02$) were rated as significantly *more* pleasant than clear losses ($M=2.64$, $SD=0.65$), $p=0.013$ (see Table 2). Unsurprisingly, however, participants were more pleased following wins ($M=3.97$, $SD=0.74$) than both near-misses and clear losses, $ps<0.001$.

H2a, which predicted that situational power would amplify the difference in valence ratings between near-misses and clear losses, was also not supported. The situational power × outcome interaction was not significant, $F(1.50, 339.62)=1.47$, $p=0.232$, $\eta^2_p=0.006$ (see Table 2).

H3a, which predicted that situational and dispositional power may jointly affect valence, was not supported. The situational power × dispositional power interaction was not significant, $F(1, 226)=0.15$, $p=0.704$, $\eta^2_p=0.001$. No other main effects or interactions were significant, $ps>0.108$.

Subjective Ratings of Arousal

To test the hypotheses regarding arousal (H1b, H2b, and H3b), the arousal scores were submitted to a similar mixed-model ANOVA.

H1b, which predicted that near-misses would be rated as more arousing than clear losses, was supported. There was a significant main effect of outcome, $F(1.79, 418.01)=22.01$, $p<0.001$, $\eta^2_p=0.086$. As shown in Table 2, near-misses ($M=2.41$, $SD=1.14$) were rated as more arousing than clear losses ($M=2.11$, $SD=0.84$), $p<0.001$. Wins ($M=2.48$, $SD=1.11$) were also rated as more arousing than clear losses, $p<0.001$, but there was no significant difference between wins and near-misses, $p=1.00$.

H2b, which predicted that situational power would amplify the difference in arousal ratings between near-misses and clear losses, was not supported. The situational power × outcome interaction was not significant, $F(1.79, 418.01) = 0.56$, $p = 0.552$, $\eta^2_p = 0.002$ (see Table 2).

H3b, which predicted that situational and dispositional power may jointly affect arousal, was not supported. The situational power × dispositional power interaction was not significant, $F(1, 234) = 0.55$, $p = 0.459$, $\eta^2_p = 0.002$. No other main effects or interactions were significant, $ps > 0.217$.

Subjective Ratings of Motivation

To test the hypotheses regarding motivation (H1c, H2c, and H3c), the motivation scores were submitted to a similar mixed-model ANOVA.

H1c, which predicted that near-misses would be rated as more motivating than clear losses, was supported. There was a significant main effect of outcome, $F(1.64, 382.61) = 43.78$, $p < 0.001$, $\eta^2_p = 0.158$. As shown in Table 2, near-misses ($M = 63.01$, $SD = 27.18$) were rated as more motivating than clear losses ($M = 58.85$, $SD = 24.33$), $p < 0.001$. Wins ($M = 68.95$, $SD = 24.87$) were also rated as more motivating than both near-misses and clear losses, $ps < 0.001$.

H2c, which predicted that situational power would amplify the difference in motivation ratings between near-misses and clear losses, was not supported. The situational power × outcome interaction was not significant, $F(1.64, 382.61) = 0.63$, $p = 0.502$, $\eta^2_p = 0.003$ (see Table 2).

H3c, which predicted that situational and dispositional power may jointly affect motivation, was not supported. The situational power × dispositional power interaction was not significant, $F(1, 234) = 0.02$, $p = 0.889$, $\eta^2_p = 0.000$. No other main effects or interactions were significant, $ps > 0.331$.

Persistence

Persistence scores indicating the number of additional scratchcards purchased ranged from 0 to 10 ($M = 3.33$, $SD = 4.33$). 48.74% of participants ($n = 116$) opted to purchase at least one additional scratchcard. As the data were non-normally distributed and over-dispersed (variance = 18.76), a negative binomial regression was conducted to test the hypotheses regarding persistence (H2d and H3d).[3] Situational power, dispositional power, and their interaction were entered as independent variables, and the count of additional scratchcards purchased was entered as the dependent variable. The dispersion parameter was estimated to be 3.24.

H2d, which predicted that high situational power would elicit greater persistence relative to low situational power, was not supported. The main effect of situational power was not significant, $B = 0.35$, $SE = 0.33$, $\chi^2(1) = 1.10$, $p = 0.295$, $\exp(B) = 1.42$ (see Table 2). However, there was a significant main effect of *dispositional* power, $B = 0.72$, $SE = 0.36$, $\chi^2(1) = 4.05$, $p = 0.044$, $\exp(B) = 2.05$, indicating that the likelihood of purchasing

[3] Although it was mentioned in the pre-registration that both an ANOVA and negative binomial regression would be conducted to test these hypotheses, the distribution of the persistence scores was still substantially non-normal after applying a log transformation; thus, only the negative binomial regression was conducted.

additional scratchcards was approximately two times higher for high dispositional power participants ($M = 4.39$, $SD = 4.61$) compared to their low dispositional power counterparts ($M = 2.48$, $SD = 3.91$).

H3d, which predicted that situational and dispositional power may jointly affect persistence, was also not supported. The situational power × dispositional power interaction was not significant, $B = -0.29$, $SE = 0.49$, $\chi^2(1) = 0.36$, $p = 0.551$, $\exp(B) = 0.74$.

Discussion

The present research sought to replicate previous findings of differential subjective appraisals to near-misses vs. clear losses and expand the literature by examining potential moderating effects of social power. Power increases the drive to work toward salient goals, suggesting that it may intensify the aversive, arousing, and invigorating properties of near-misses, a form of goal blockage in a gambling context, and increase the propensity to engage in prolonged play. To investigate these research questions, an online study was conducted in which power was experimentally manipulated and a scratchcard task delivering different outcome types was administered.

Despite being objectively equivalent losing outcomes, near-misses were rated as eliciting higher levels of arousal (H1b) and greater motivation to continue playing (H1c) compared to clear losses. These results are consistent with those of previous laboratory studies on near-misses more generally (Clark et al., 2009, 2012, 2013) and on near-misses in scratchcard games in particular (Stange et al., 2016, 2017a, b), suggesting that subjective appraisals toward different outcomes may be similar across games and offline/online settings.

However, for the subjective ratings of valence (H1a), a difference was discovered between near-misses and clear losses in the opposite direction from what was expected. Surprisingly, participants in the current study perceived near-misses to be *more* pleasant than clear losses, whereas past research generally found that near-misses were rated as more unpleasant, frustrating, and disappointing than clear losses (Barton et al., 2017; Stange et al., 2016, 2017a), pointing to their clearly aversive nature (but see Clark et al., 2013, who distinguish between different types of near-misses on a slot machine). Given that the gambling task in this study closely mirrored a previously used scratchcard paradigm, including the way in which valence was measured (i.e., using the SAM), the frequency of near-misses and clear losses (i.e., one vs. four), the configuration of near-misses and clear losses (i.e., two matching symbols denoting the top prize and six non-matching symbols, respectively), and the number of mandatory trials, the discrepancy in results may potentially be attributable to sample differences. For example, over half of the current sample (59.24%) had a PGSI score of 0, which is actually lower than the percentage reported in previous studies (e.g., Stange et al., 2017a: 66.13%; Stange et al., 2016: 71.43%), albeit those previous studies recruited participants who had experience playing scratchcards while the current study did not set such an inclusion criterion. However, it is unlikely that degree of gambling involvement accounts for the discrepancy in results, as the greater aversiveness of near-misses compared to clear losses has been reported even in samples with minimal gambling involvement (Qi et al., 2011; Sharman & Clark, 2016). Another possibility is that there are cultural differences in how near-misses and clear losses are interpreted. Participants in the current study were Hong Kong Chinese, while previous studies on near-misses tended to recruit individuals from Western countries (Barton et al., 2017).

It has been demonstrated that East Asians and Westerners perceive change differently, such that East Asians are more likely to anticipate changes in events and to expect non-linear trajectories of change (Ji et al., 2001). Along this line of thinking, it is possible to speculate that participants in the current study may have viewed near-misses as a signal that their luck was changing, and thus perceived near-misses more positively than clear losses. However, a caveat of this explanation is that a previous study using Chinese participants and a slot machine task reported that, similar to studies with Western participants, near-misses were perceived as more unpleasant than clear losses (Qi et al., 2011), although the sample size of that study was extremely small ($N = 17$) which may compromise the reliability of the results. Thus, further research will be needed to confirm whether such cultural differences exist.

With regard to moderating effects of situational power, the hypotheses that elevated situational power would amplify differences between near-misses and clear losses in terms of valence (H2a), arousal (H2b), and motivation (H2c) were unsubstantiated by the results, given the lack of significant situational power × outcome interactions. Elevated situational power also did not appear to elicit greater persistence (H2d). Similarly, with regard to the exploratory hypotheses (H3a–H3c), there were no significant interactions between situational and dispositional power on any of the outcome variables. Hence, although the imaginary role task was shown to be effective in eliciting differences in reported sense of power in a pilot study, it appears that this manipulation was not sufficiently strong enough to change cognition or behavior in a gambling context.

In contrast to situational power, however, *dispositional* power seemed to carry greater weight in affecting participants' behavior. Specifically, there was a significant main effect of dispositional power on persistence, such that high dispositional power was associated with a greater likelihood of purchasing additional scratchcards. By purchasing additional scratchcards, participants had more chances to win the top prize and maximize their earnings, which was presumably a salient and desirable goal for them, but attainment of this goal was not certain and came at the cost of giving up part (or potentially all) of their winnings. Thus, the measure of persistence can be viewed as both a measure of goal striving and a measure of risk-taking. The fact that high dispositional power participants were more likely to engage in continued play compared to their less dispositionally powerful counterparts is consistent with previous experimental findings that powerful individuals persist longer in goal pursuit (Guinote, 2007) and have an increased propensity to take risks (Anderson & Galinsky, 2006). The current study demonstrates that such approach-related effects may also occur in gambling contexts in the form of prolonged play, although careful interpretation is warranted due to the correlational nature of the findings regarding dispositional power.

Limitations can be noted regarding the imaginary role task used to manipulate power. Although this task did not require participants to recall an actual experience of high or low power as would be the case with an episodic recall task, for which the effectiveness may depend on the ease of retrieval of such experiences (Lammers et al., 2017), a similar critique can be made about the imaginary role task in that its effectiveness may depend on participants' creativity or idiosyncratic construal of what being in a position of high power entails. Moreover, the online nature of the study may have yielded low engagement on the task, resulting in a weak effect of the manipulation. Indeed, there is some evidence to suggest that the manipulation may not have worked as intended, given that it did not seem to change even participants' state level of BAS activation as measured immediately after the manipulation. A post hoc analysis indicated that participants' assigned condition did not significantly affect state BAS activation, $F(1, 234) = 2.35$, $p = 0.126$, while dispositional power was significantly correlated with state BAS activation, $F(1, 234) = 4.03$, $p = 0.046$.

To confirm the role of power in affecting persistence while controlling for confounding variables, future studies could perhaps employ structural manipulations of power, in which participants assigned to the high power condition are given the ability to divide rewards among others and therefore possess some degree of actual control over valued resources (e.g., Anderson & Berdahl, 2002; Galinsky et al., 2003; Sivanathan et al., 2008).

Some limitations of the study design and scratchcard task also warrant a mention. Given that outcome was manipulated within subjects such that participants experienced all three types of outcomes in the same order and frequency, the findings regarding persistence cannot clearly be attributed to the experience of near-misses in particular. To resolve this uncertainty, a between-subjects design could be used in future studies in which participants are exposed to either a near-miss or clear loss in the last game preceding the persistence phase (e.g., Stange et al., 2017b). The rating procedure may also have limited sensitivity for assessing affective and motivational responses to outcomes, as participants may have found the trial-by-trial ratings to be repetitive, boring, and inconsequential to their winnings on the task (Sescousse et al., 2016). Furthermore, the task generates limited behavior apart from the purchase of additional cards. Future studies conducted offline may consider including more sensitive measures of affect and motivation, as well as using other measures of behavior. For example, Wadhwa and Kim (2015) found that relative to clear losses, near-misses also seem to elicit motivational effects on unrelated subsequent tasks (e.g., walking faster to obtain a chocolate bar, salivating more in response to money images, working harder on a card-sorting task to earn a reward). The experience of just narrowly missing a reward may lead to a generalized motivational state of approach, inducing individuals to either persist on the gambling task when given the opportunity, or, if the original reward becomes unavailable, to exert more effort to obtain desirable outcomes on other tasks. To the extent that individuals with elevated power also display stronger tendencies to engage in these behaviors after experiencing near-misses in particular, such results would provide stronger support for the idea that power constitutes a condition under which the occurrence of near-misses, compared to clear losses, induces even greater effort and persistence.

Conclusion

This study provides preliminary evidence regarding how social power may influence scratchcard gambling behavior. Efforts to replicate previous findings regarding subjective differences between near-misses and clear losses were successful, although a surprising finding emerged for valence in that participants perceived near-misses to be *more* pleasant than clear losses. Contrary to hypotheses, situational power did not amplify subjective appraisals to near-misses or increase persistence, although this may be partly due to weaknesses of the manipulation used. Nevertheless, there was a notable effect of *dispositional* power in that participants who felt chronically high in power were twice as likely to purchase additional scratchcards compared to their low dispositional power counterparts.

Further investigation with other manipulations of power, samples, and contexts may be worthwhile, as discovering significant effects of power would expand knowledge regarding tendencies of the powerful and powerless in the context of gambling, and would hold implications for conditions that influence gambling behavior in the real world.

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Data availability statement Data are available from the corresponding author upon request.

Declarations

Conflict of interest The authors have no competing interests to declare.

Ethics Approval This study was performed in line with the principles of the Declaration of Helsinki and was approved by the Survey and Behavioral Research Ethics Committee at The Chinese University of Hong Kong.

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