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ORIGINAL PAPER

Self-compassion Buffers Impaired Decision-Making by Potential Problem Gamblers in a Casino Setting

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Abstract

Self-compassionate individuals treat themselves kindly when undergoing stress. The present study examined self-compassion's relationship to risky decision-making on a gambling task by 240 problem and non-problem gamblers who were tested in a casino setting. Multi-level modeling analyses showed that participants expressed differential rates of learning to avoid risks on the gambling task, depending on their status as potential problem/non-problem gamblers and their level of self-compassion. Among potential problem gamblers, participants higher in self-compassion showed significant gains in performance over decision-making trials, which approximated those of non-problem gamblers and adults without impairments in the population. In contrast, potential problem gamblers lower in self-compassion showed chance levels of performance, which approximated those of adults with impairments. In some circumstances, self-compassion can disinhibit individuals from taking greater risks. For potential problem gamblers in a casino setting, however, the benefits of self-compassion as a means to reinforce self-control appear to outweigh the risks.

Keywords Self-compassion · Risky decision-making · Multi-level modeling · Problem gambling severity index · Iowa gambling task

Introduction

With the release of DSM5, gambling disorder is now recognized as an addiction (American Psychiatric Association [APA] 2013; Petry et al. 2014). Due to learned associations and strong activation of reward centers in the brain (Hewig, Kretschmer et al. 2010), people who may have an addictive relationship to gambling are likely to think, feel, and

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act differently in a setting where they can gamble, and where this activity is salient, than they would in another setting. Therefore, laboratory-based studies have often simulated key features of gambling settings, such as bars, video lottery terminals, or casinos, in order to gather evidence about gambling behavior that can be generalized to the settings where betting and gambling-related harms occur (Graydon et al.2018; Murch and Spencer 2019). However, field studies that take place directly in these settings are also vital to understanding how individual-difference and treatment variables might operate in setting-specific ways when predicting behavior (Campbell 1969; Gainsbury and Blaszczynki 2011). The present research used the field-study approach in a casino setting to examine how gambling risk-taking behaviors may be associated with individual differences in self-compassion.

As compared with individuals lower in self-compassion, those higher in self-compassion treat themselves with more kindness and understanding in times of hardship or failure. According to Neff's (2003) seminal work on this construct, self-compassion reflects several inter-related tendencies to respond to one's own distress with (a) self-acceptance rather than self-judgment, (b) a broad and mindful perspective rather than over-identification with one's problems, and (c) a sense of common humanity rather than isolation from others in having such problems. Self-compassion connotes a sense of self-worth and promotes psychological well-being, as previous research has shown (Barnard and Curry 2011; Gunnell et al. 2017; Neff and Seppälä 2017). Yet self-compassion also functions differently from self-esteem in this regard. In particular, unlike self-esteem, self-compassion reduces the feelings of ego threat and fear of negative social evaluations that otherwise commonly occur in response to hardship or failure, and that can make coping with these situations even more difficult (Crocker and Park 2004; Leary et al. 2007; Leary and Guadagno 2011; Neff 2011).

The same mechanisms that make self-compassion adaptive for well-being in a wide range of situations still might not produce wiser gambling decisions by either non-problem or problem gamblers. Among non-problem gamblers, gambling activity is unlikely to bring about the kind of emotional excitement or suffering that arouses self-compassion in some people (and self-judgment in others) in the first place. Thus, there is little reason to expect individual differences in self-compassion to influence gambling decisions in either a risky or cautious direction among non-problem gamblers. Among potential problem gamblers, negative emotional involvement in gambling is a common diagnostic feature (i.e., anxiety or stress when gambling; preoccupation, restlessness, and irritability when not gambling; APA 2013; Ferris and Wynne 2001). Such emotional involvement activates self-compassion and thereby creates the opportunity for gambling decisions to be influenced by the individual's self-compassionate (or uncompassionate) predisposition. Overall, then, it stands to reason that self-compassion may only function as a driver of gambling decisions in the subset of the population that experiences problem gambling, and not in the population as a whole.

Even so, among potential problem gamblers, the direction is still unclear as to whether higher self-compassion, will tend to mitigate or accelerate taking gambling risks. As we review subsequently, different theoretical aspects of self-compassion that might be salient in a gambling situation could serve either to disinhibit risk-taking or to reinforce self-control in this group. Thus, the aim of this study was to compare the responses of non-problem and potential problem gamblers to a gambling task that was further presented in a gambling setting. In this way, we could determine empirically whether higher self-compassion, especially in potential problem gamblers, would be associated with taking either more or fewer gambling risks.

Predicting In Situ Gambling Decisions

The difficulty of predicting the relative risk-proneness or risk-aversion of individuals' gambling decisions, particularly for problem gamblers in this specific context, is that either prediction can be theoretically justified, given our current understanding of self-compassion. On the side of disinhibition, in situations where anticipating the pain of failure or social disapproval might help to keep one's risk-taking in check, factors that soothe this pain could remove the check and allow reward-based risk-taking to proceed. Ample evidence supports that a greater presence of self-compassion has a soothing effect on the emotional pain of anticipated failure and disapproval in multiple settings (Leary et al. 2007; see Neff and Seppälä 2017, for a review). In line with such reasoning, studies by Squires et al. (2012; see also Wohl et al. 2017) have shown that self-forgiveness reduces people's motivation for applicable problem-behavior change, including that of problem gambling. However, self-forgiveness is not identical to self-compassion, and related individual differences in motivation for change could also vary between contemplating one's problem behaviors in general, versus in the situation where they might be performed.

On the side of reinforcement of self-control, gambling settings differ from non-gambling settings, in part, by presenting many environmental cues that can distract decision-makers and impel reward-seeking automatically among potential problem gamblers. Yet previous research on self-compassion in other behavioral domains has shown that it can help people to avoid acting on impulse. For example, Mantzios (2014) surveyed men who were military recruits in their second week of basic training. Recruits higher in self-compassion scored significantly lower on a questionnaire measure of impulsivity. Among individuals with binge eating disorder, Kelly and Carter (2015) conducted a randomized controlled trial of a 3-week food planning plus self-compassionate writing intervention. Participants in this intervention condition increased their self-compassion and reduced their frequency of binge eating, eating concerns, and weight concerns, relative to participants in control conditions. By extension, these studies suggest that self-compassion could be associated with less risky decision-making by potential problem gamblers, when tested in a setting where they might otherwise yield to impulsive decisions.

In summary, previous research has not furnished a specific hypothesis, as to whether self-compassion's relationship to gambling decisions in this setting might be either risk-prone or risk-averse, but it has furnished the means to conduct a critical test between these two possibilities. Specifically, the Iowa Gambling Task (IGT; Bechara 2007; Bechara et al. 1994) provides a normative assessment of individuals' decision-making capacity, in which the marker for impairment is also an ideal criterion for this research: i.e., impulsive reward-seeking over multiple trials, and repeatedly making decisions against one's long-term best interest. By presenting the IGT to participants in a gambling venue, we could examine how potential problem and non-problem gamblers would perform in this setting, and how having relatively high or low self-compassion might further differentiate individuals' task-performance in each group. Impaired performance is clearly indicated by failure to learn and avoid the location of high-risk card selections over 100 trials of the IGT. Thus, our specific research question was whether the impaired performance pattern would appear more commonly in the case of potential problem gamblers who were higher, or those who were lower, in self-compassion.

Method

Participants and Procedure

In order to conduct this study, we created temporary research stations with signage, tables and chairs, laptop computers, and boxes for materials and file storage, in the central lobby areas of two major casinos in Winnipeg, Manitoba (Canada). Two experimenters at a time attended to the stations and engaged in both passive recruitment of casino patrons who expressed interest in the study, and active recruitment of those on the floor, with the proviso that no one was approached while playing a gambling game. All potential participants were asked during recruitment if they were trying to stop or avoid gambling for any reason. Those who answered affirmatively were advised that the study benefits might not outweigh the risks. We created a schedule of data collection over 2 months that sampled all days of the week and all hours of the day when these casinos were open, in 6-h blocks. Upon recruitment, participants gave written informed consent and completed pen-and-paper administration of the demographic and personality measures, followed by computer-administration of the IGT and post-procedural debriefing. In exchange for their time, all participants received the incentive of a $10 gift card to a local restaurant. All responses were collected anonymously and transferred daily from the research station to a secure university lab. Permission was obtained from the managers of each casino, and all procedures were approved by the university Research Ethics Board in advance.

In total, 240 casino patrons participated in this research.[1] Of these participants, 21 did not provide usable data on the IGT, and 3 did not provide usable data on the Self-Compassion Scale. The resulting sample of $N=216$ participants with usable data consisted of 112 (52%) females and 101 (47%) males, none who selected a non-binary option, and 3 (1%) who declined to state a gender. The participants ranged from 18 to 85 years of age, and had a mean age of 53. The ethnic mix included individuals of White/European (57%), Aboriginal/First Nations (12%), Filipino (8%), Métis (5%), and Chinese (2%) heritage, among many others. Annual pre-tax household income was measured in ranges from under $20,000 to over $100,000, and the median of the present sample fell in the range of $50,000-$80,000 per year. The sample was about evenly divided between participants who had (47%) vs. had not (53%) completed post-secondary education, and between those who reported gambling more often (51%) vs. less often (48%) than once per month. Excluded participants did not differ significantly from retained participants in terms of their gender, ethnicity, or household income. However, excluded participants were significantly older than those who were retained ($M_{age}=65$ vs. 53 years), $t(35.329)=4.689$, $p<0.001$, $d=0.81$. They were also significantly more likely to report not finishing high school (21% vs. 8%), χ^2 ($N=239$) $=4.32$, $p=0.04$, and gambling more often than once per month (75% vs. 52%), χ^2 ($N=237$) $=4.74$, $p=0.03$. Thus, although 90% of participants provided usable data and were retained, the present findings should be generalized cautiously to the broader

[1] A priori power analysis was not performed. Although power and sample size estimation in multi-level modeling are complex topics that continue to be discussed in the literature, such discussion focuses on the typically small number of observational units at the highest level of organization (e.g., schools, communities) in a given study. In this case, however, individuals are the highest-level unit of organization in the study, and a sample of 200 or more clearly exceeds common standards of 50–60 as a threshold for concern about either bias or non-convergence of multi-level models (Maas and Hox 2005; Tabachnick and Fidell 2007).

populations of seniors, those with primary education levels, and high-frequency gamblers who may have been underrepresented here.

Measures

Demographic and personality measures were administered via questionnaire. The demographic response options are included in a supplemental file.

To assess problem gambling, participants answered the 9-item Problem Gambling Severity Index (PGSI; Ferris and Wynne 2001). The PGSI is a well validated, brief screening measure of potential problem gambling that is widely used in population surveys. With reference to all forms of gambling undertaken in the last 12 months (i.e., including lottery tickets, playing bingo, card games with friends, or any activity that involves betting money or gambling on different things), participants use a response scale of 0 (*never*), 1 (*sometimes*), 2 (*most of the time*), or 3 (*almost always*) to report how often they have engaged in activities such as "gone back another day to try to win back the money you lost," or had experiences such as "needed to gamble with larger amounts of money to get the same feeling of excitement." The PGSI is scored by summing responses across the 9 items, and it is typically interpreted with reference to the following cutoff scores: 0 (*non-problem gambling*), 1–2 (*low-level problem gambling*), 3–8 (*moderate problem gambling*), 8+ (*severe problem gambling*). The PGSI has been validated in previous research in several ways, such as its correlation with other diagnostic gambling screens, retrospective or prospective association with gambling activity or development of problem gambling, and ability to discriminate between different types of problem gamblers (Miller et al. 2013; Orford et al. 2010; Sanscartier et al. 2018). Internal consistency of the PGSI items in the present sample was excellent, $\alpha = 0.92$.

To assess self-compassion, participants completed the 12-item short form version of the Self-Compassion Scale (SCS-SF; Raes et al., 2011).[2] To answer the scale, participants selected a response from 1 (*almost never*) to 5 (*almost always*) to indicate how often they behave in line with statements reflecting six subscales of self-compassion: i.e., self-kindness (e.g., "I try to be understanding and patient towards those aspects of my personality I don't like"), self-judgment (e.g., "I'm disapproving and judgmental about my own flaws and inadequacies"), common humanity (e.g., "I try to see my failings as part of the human condition"), isolation (e.g., "When I'm feeling down, I tend to feel like most other people are probably happier than I am"), mindfulness (e.g., "When something painful happens, I try to take a balanced view of the situation"), and over-identification (e.g., "When I'm feeling down I tend to obsess and fixate on everything that is going wrong"). The SCS-SF is scored by first reversing items from the self-judgment, isolation, and over-identification subscales, and then averaging over the whole set of items to produce an overall self-compassion score. Previous research has used confirmatory factor analysis to demonstrate the adequacy of representing self-compassion with an overall score, and other correlational methods to demonstrate the adequacy of the SCS-SF to represent the long form of the Self-Compassion Scale (Raes et al. 2011). Internal consistency of the SCS-SF items in the present sample was acceptable, $\alpha = 0.78$.

[2] Additional measures related to passion for gambling were included in this study after the SCS-SF. Results of these measures have been reported elsewhere (Schellenberg and Bailis 2018), and the measures themselves are included in the supplemental file to accompany this article.

Finally, to assess risk-taking, participants completed the IGT (Bechara 2007; Bechara et al. 1994) on a laptop computer. The IGT is a model of real-life decision-making under uncertainty, in which trial-and-error is the participant's only means of learning how to perform well on the task. For the participant, each trial consists of making a card selection from one of four equal decks that are presented on the computer screen. Each selection results in feedback to the participant about the consequences of his or her choice: i.e., an amount of money won or lost, which is expressed in words and illustrated on-screen by means of proportionate increases or decreases in a bar representing total cash. Although the participant can only guess at these consequences initially, the decks are arranged such that two of them are advantageous in the long run (i.e., presenting small rewards but small or infrequent penalties as well), whereas the other two are disadvantageous (i.e., presenting large rewards but large or frequent penalties as well). Over the course of 100 trials, performance on the task can be gauged by the increasing net frequency of selections from the advantageous relative to the disadvantageous decks. In the task-software used here, net scores were automatically generated for 5 blocks of 20 trials each. Each score equaled the number of advantageous minus disadvantageous deck selections in each trial block. In the context of research on gambling, stronger performance on the IGT reflects better ability of the participant to resist the lure of large or immediate rewards and to be cognizant of the long-term potential for loss. While the IGT was originally developed to assess cognitive functional deficits in patients with frontal lobe injuries, it has been used to study decision-making in many other clinical contexts as well, including problem gambling (e.g., Cavedini et al. 2002), with reference to available population norms from U. S. Census-matched samples (Bechara 2007).

Results

The specific aims of this research were to estimate and evaluate: (a) the relationship between participants' self-compassion and growth in IGT performance, and (b) the contingency of this relationship on participants' status as non-problem or potential problem gamblers. We used multi-level (hierarchical) linear modeling (Raudenbush and Bryk 2002) to accomplish these aims. By means of this approach, we could reflect the structure of the data set, in which observations from IGT trial blocks (Level 1) were nested within observations from individuals (Level 2). Multilevel linear modeling proved also to be a flexible approach, in that it required fewer assumptions than the alternative of repeated measures ANOVA, retained the continuous measurement properties of the self-compassion scale used in this research, and allowed for estimation of the intraclass correlation, fixed and random effects, and cross-level interaction effects, which corresponded to the conceptual aims of this research (Tabachnick and Fidell 2007). All analyses were carried out using the MIXED procedure in SPSS version 25 software.

Preliminary Analyses

Prior to analysis, we screened the data for univariate and multivariate outliers among the cases, as well as conformity to the assumptions of normality and linearity among the variables of interest. No univariate outliers were detected using the standard of ± 3 *SD* from the means of self-compassion or net IGT performance across all trials. These variables also displayed normal distributions with no significant skewness, and a linear relationship

Table 1 Descriptive statistics and correlations among the focal variables and demographic indicators

Variables	1	2	3	4	5	6	7	8
1. IGT Performance (− 100 to + 100)	10.3 (30.4)							
2. Self-compassion (1–5)	.05	3.4 (0.7)						
3. PGSI (− 1 = none; 1 = any)	− .16*	− .06	66%					
4. Age (18–85 years)	− .03	.34***	− .16*	53.2 (17.9)				
5. Gender (0 = female, 1 = male)	− .13	.01	.00	− .02	47%			
6. Gambling frequency (0 = ≤ 1x/mo, 1 > 1x/mo)	− .01	.16*	.32***	.11	− .06	51%		
7. Lower Income (0 = median +, 1 < median)	− .10	.05	.18*	.00	− .03	.17*	44%	
8. Lower Education (0 = secondary +, 1 = primary)	− .02	.02	− .08	.09	.10	.01	.17*	8%

IGT = Iowa Gambling Task (net of 100 trials); PGSI = Problem Gambling Severity Index (with effect coding described in text). Sample means (standard deviations) or percents in the category coded as 1 appear on the diagonal, with correlations below

*$p<.05$; **$p<.01$; ***$p<.001$

with each other as determined through inspection of scatterplots and regression residuals (Tabachnick and Fidell 2007). Unsurprisingly, however, the distribution of PGSI scores was extremely positively skewed, with most scores at 0 or 1 but a long tail of higher scores reaching up to the maximum of 27. We opted to dichotimize this variable, using effect coding to distinguish non-problem gambling (coded as − 1, $n=73$) from any potential problem gambling (coded as + 1, $n=143$). This strategy, which was consistent with both previous research (Squires et al. 2012) and the intended testing of moderation by problem gambling status in this research, corrected the problem of skewness and outliers while also maintaining a clear conceptual interpretation of the original scores (i.e., reporting none vs. any signs of problem gambling in the past 12 months). Using regression to generate Mahalanobis distances, no multivariate outliers were detected with $p<0.001$, in the space defined by net IGT performance, self-compassion scores, and the dichotomously transformed PGSI scores. Table 1 presents descriptive statistics and correlations among the focal variables and demographic indicators. As no demographic characteristics were associated with both the predictor and performance variables of interest to this research, we opted not to include any demographic covariates.

Multilevel Modeling

The first model-building step was to estimate an intercept-only model of IGT performance. This step provided a null model (i.e., with no predictors), against which subsequent models including predictors could be compared, using the χ^2 test of differences in the − 2 log

Table 2 Comparison of multi-level models of IGT performance

Model	− 2 Log-likelihood	*df*	χ^2
1. Intercept (random)	7747.72	3	
2. Intercept (random) + NET (fixed)	7726.98	4	M1 − M2 = 20.74****
3. Intercept (random) + NET (random)	7687.76	6	M1 − M3 = 59.96****
4. Intercept (random) + NET (random) + SC (fixed) + PGSI (fixed) + SC*PGSI + NET*SC + NET *PGSI + NET*SC*PGSI	7666.71	12	M1 − M4 = 81.01**** M3 − M4 = 21.05***

NET = trial blocks (coded 0–4). SC = self-compassion (mean-centered). PGSI = Problem Gambling Severity Index (with effect coding described in text)

$^{***}p < .005$; $^{****}p < .001$

likelihood of each model to assess improvement at each step (see Table 2).[3] The estimate of the fixed component of the intercept, 2.05, equaled the grand mean of net-advantageous deck selections across trial blocks and individuals in the sample.[4] In this case it is meaningful that the intercept differed significantly from 0, which would correspond with chance performance on the IGT or failure to learn from previous trials on the task. The remaining estimates of the random components (i.e., variation between individuals, and variation between trial blocks within individuals) permitted calculation of the intraclass correlation coefficient, $\rho = 0.28$. This coefficient showed that 28% of the variance in IGT performance was associated with differences between individuals, which could include (pending the results of subsequent tests) the predictors of interest to this research.

The next step added NET as a level-1 predictor, which represented growth in performance over the 5 trial blocks of the IGT. NET was scored using integers from 0 for the initial trial block through 4 for the remaining blocks. We assumed that NET should be considered as a random factor in our analysis, so as to model individual differences in the slopes of performance growth over trial blocks. However, alternate runs of this analysis, treating NET as a fixed or random effect, further showed a reduction in the − 2 log likelihood that was about 3 times greater with NET as a random effect (see Table 2); therefore the random effect model was retained. This analysis estimated the average slope or growth in IGT performance from one trial block to the next at 0.77 more net-advantageous deck selections on a possible range from − 20 to + 20. However, individual differences in these slopes remained significant, $\tau_{11} = 3.15$, Wald $Z = 3.66$, $p < 0.001$, as were residual individual differences in the intercepts, $\tau_{00} = 17.80$, Wald $Z = 3.52$, $p < 0.001$.

The final step added self-compassion, problem gambling severity, and all of the possible 2-way and 3-way cross-level interactions between these level-2 predictors and the level-1 predictor, NET, to the foregoing model. This step addressed our specific aims to determine the possible role of self-compassion in predicting IGT performance, as well contingency of that role on individuals' problem gambling status. Both of the level-2 predictors were treated as fixed. Self-compassion scores were centered and problem gambling severity was effect-coded prior to this analysis so that scores of 0 on these variables would have a

[3] All of the present models specified maximum-likelihood estimation, as required for this test of nested models (Tabachnick and Fidell 2007), and an unstructured covariance matrix as the least restrictive option.

[4] Because this was the mean for a trial block, and there were 5 trial blocks in all, the grand mean across trials equals 2.05 × 5 = 10.3 net advantageous deck selections as shown in Table 1.

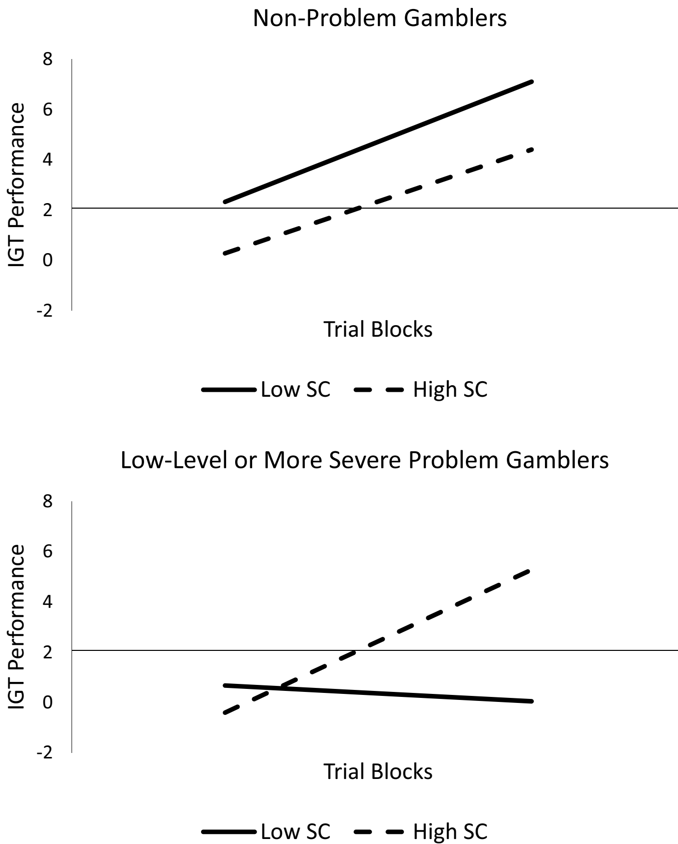

Fig. 1 Simple slopes of performance over trial blocks (0–4) of the Iowa Gambling Task by high and low self-compassionate (SC) participants grouped as non-problem gamblers (upper panel) versus low-level or more severe problem gamblers (lower panel). Performance equals the net number of card selections from advantageous decks minus those from disadvantageous decks, which has a possible range from −20 to + 20 in each block. Slopes for high and low self-compassionate participants are estimated at the sample mean ± 1 SD scores of self-compassion. The horizontal axis crosses the vertical axis at the estimated mean level of IGT performance

meaningful interpretation in relation to the intercept of IGT performance. The addition of these predictors resulted in significant reductions to the −2 log likelihood, as compared with the null model and the model with only the level-1 predictor, NET (see Table 2). The fixed effect of the 3-way interaction of self-compassion × problem gambling severity × NET on IGT performance was significant, F (1, 215.85) = 4.61, p = 0.03. Figure 1 illustrates the simple slopes for the 3-way interaction, which we obtained by using the online calculator by Preacher et al. (2006) found here: http://quantpsy.org/interact/hlm3.htm.

Each panel of Fig. 1 shows the simple slopes of IGT performance over trial blocks at representative high and low values of self-compassion. The upper panel shows these slopes for non-problem gamblers, and the lower panel shows these slopes for low-level or more severe problem gamblers. Among non-problem gamblers, both high- and low-self-compassionate participants showed significant performance gains on the IGT. Those lower in self-compassion performed at or above the grand mean of IGT performance in all trial blocks,

whereas those higher in self-compassion achieved the grand mean by about the third trial block.[5] In contrast, among potential problem gamblers, participants with higher self-compassion showed performance gains on the IGT, whereas performance by those with lower self-compassion non-significantly decreased. Thus, higher self-compassion appeared to buffer against the tendency of potential problem gamblers, in particular, to pursue large rewards myopically and make risky selections on the IGT.

In addition to simple slopes, interpretation of an interaction can be enhanced by considering regions of significance (Preacher et al. 2006). In this case, regions of significance corresponded with boundary levels of self-compassion in each problem gambling category, at which participants were able to make significant performance gains over the course of the IGT. Regarding non-problem gamblers, although no difference in the simple slopes was visually apparent (see upper panel of Fig. 1), regions of significance beyond the illustrated ± 1 *SD* levels of self-compassion were found. Thus, non-problem gamblers with a self-compassion score more than 0.87 scale points above the sample mean ($z = 1.28$) were predicted not to exceed chance levels of performance or improve significantly on the IGT over all 5 blocks of trials. Only 10% of the present sample had such high self-compassion scores, however.

Among low-level or more severe problem gamblers (see lower panel of Fig. 1), extremely low-scorers on self-compassion (-1.53 scale points, or $z \leq -2.25$) were predicted to gravitate toward risky deck selections on the IGT (i.e., their performance became significantly worse over trials). Less than 1% of the present sample reported such low self-compassion scores. Yet improvement on the IGT, which was reliably observed at higher levels of self-compassion, first became significant at a boundary level slightly below the sample mean of self-compassion (-0.14 scale points, or or $z \geq -0.21$), which accounted for 55% of participants in this research. In sum, higher self-compassion predicted increased risk-taking on the IGT for a small percentage of non-problem gamblers, and decreased risk-taking for a much larger percentage of potential problem gamblers.

Discussion

Whereas previous research presented an unclear picture of how self-compassion might be related to the riskiness of in situ gambling decisions, by both potential problem and non-problem gamblers, the present research aimed to address the matter by measuring participants' problem gambling severity, self-compassion, and performance of a gambling task in a casino setting. The results are indeed clarifying, though complex, given the central finding that these factors interactively determined risk. To anticipate our main conclusion, these results suggest that the potential positive consequences of self-compassion for participants' decision-making outweigh the potential negative consequences, though both were observed, in the casino setting.

Among non-problem gamblers, we found no evidence to suggest that being more self-compassionate helped individuals to avoid taking gambling risks. Self-compassion positively predicted gambling more often than once per month in the sample as a whole, and performance levels and gains on the IGT were consistently lower and slower for

[5] An analysis we report in the supplemental materials shows that there is no significant difference in IGT performance between non-problem gamblers who are higher versus lower in self-compassion.

non-problem gamblers who were higher in self-compassion, as compared with those lower in self-compassion. Our regions-of-significance analysis further revealed that some non-problem gamblers, but only those above the 90th percentile of self-compassion, showed myopic reward-seeking to such an extent that they failed to demonstrate any significant learning beyond chance performance of the IGT. Such cases are rare, however, and one might also question the harm involved in poor decision-making on this or any gambling task, in cases without further indications of potential problem gambling.

Among potential problem gamblers, however, we found substantial evidence to suggest that high self-compassion buffered what would otherwise be poor decision-making on the IGT. In this subgroup, significant performance gains were typical of individuals who were higher rather than lower in self-compassion, and these gains became statistically better than chance performance at levels of self-compassion that were common in the present sample (i.e., slightly below the sample mean). If we recall the important role that the casino setting itself was expected to have in distracting and automating potential problem gamblers' responses to the IGT, the present findings appear to corroborate research in other contexts showing that self-compassion helps people to avoid making impulsive decisions (Mantzios 2014; Kelly and Cater 2015). Yet what is striking about the results in Fig. 1 is not just that the simple slopes differ signficantly between high and low self-compassionate individuals who are potential problem gamblers, but that the performance trajectory of potential problem gamblers with high self-compassion is nearly identical to that of non-problem gamblers with high self-compassion. Viewed from this perspective, the results suggest that high self-compassion fully mitigates the relationship that problem gambling severity has with poor IGT performance.

In addition to the IGT's internal framework, by which we can compare observed performance of potential problem gamblers with chance performance, it is also illuminating to consider the IGT's normative framework, by which we can compare observed performance of these individuals to population norms. Bearing in mind that the following estimates pertain to just the normal range of self-compassion (i.e., $M \pm 1$ SD), the point-estimate of typical performance in Block 5 of the IGT for potential problem gamblers with lower self-compassion was 0.05. According to normative data from a U.S. census-matched sample (Bechara 2007), this performance level corresponds with the 31st percentile of test-takers aged 18 and over. It also corresponds with the overall IGT score that marks the bottom-most score of the normal range for purposes of clinical assessment. Any lower score would be consistent with neuropsychological impairment in these individuals. Yet among their counterparts with higher self-compassion, who are also tested in the casino setting, the performance level is quite different. The Block 5 point-estimate of 5.30 corresponds with the 54th percentile of overall scores in the U.S. census-matched comparison sample. In lay terms, among people who are found in a casino and show any signs of potential problem gambling, variations in self-compassion that are well within the normal population range can account statistically for the difference between gambling task-performance that is assessed as normal, and that which is assessed as impaired.

We take note of several limitations that are inherent in the design of the present research. First, despite the use of a repeated-measures design to estimate relationships of self-compassion with change in performance over trials in a gambling task, even these designs are limited to statistical relationships and cannot support inferences of a causal relationship between self-compassion and gambling decisions. The present study ruled out demographic factors but did not assess or control for other personality factors that might be related to both self-compassion and gambling task-performance. Such personality factors could still present alternative explanations for the associations shown here.

Thus, although these statistical associations were found to be reliable, sequential, and meaningful in terms of clinical significance, further research is needed before making any causal claims about self-compassion and taking or avoiding gambling risks. Second, despite the use of a casino setting, realism of the present study is still limited by our use of the IGT, which is not a casino game but a standardized assessment. Third, and relatedly, although our study qualifies as a field study due to its recruitment and testing of participants in a natural (i.e., non-laboratory) setting, field methods can extend much further into the participants' world and worldview through the use of direct observation and ethnographic or qualitative interviews. Further research of this kind could supplement the present findings by investigating, for example, the appeal of different casino games to individuals varying in self-compassion, or the words they use to explain their betting decisions to themselves. Finally, despite our awareness of the costs to well-being that can be incurred when gambling decisions get beyond individuals' self-control, the present study did not include measures of well-being. We do not know how participants' mood, self-esteem, or life satisfaction may have varied in connection with the riskiness of the decisions they made; these questions await future research.

In conclusion, the main contribution of this research is the numerical insight it offers to understanding the costs and benefits of self-compassion, particularly for risky decision-making by potential problem gamblers in a casino setting. In this distracting and tempting environment, we found higher percentages of people who could have been helped than who could have been harmed by self-compassion, in their ability to think clearly, learn from feedback, and avoid making risky card-selections on the IGT. We also found that where self-compassion may have helped, it appeared to do so completely, or to such an extent that it predicted equal performance by highly self-compassionate participants who were potential problem gamblers as to those who were non-problem gamblers, and to adults in the general population. Some previous research has identified theoretical processes of disinhibition (Leary et al. 2007; Neff and Seppälä 2017; Squires et al.2012; Wohl et al. 2017), whereby self-compassion could promote rather than prevent taking risks. Yet from a practical, harm-reduction perspective, in the situation where gambling-related harms are likely to occur, the present results show self-compassion to be a promising avenue by which those at greatest risk may be helped to retain their self-control.

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Code Availability Data and code are not available for this study because the participants did not consent to open data sharing, and re-obtaining their consent to this procedure is not possible.

Compliance with Ethical Standards

Conflict of interest The author declares that they have no conflict of interest statement.

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