



Does Self-Compassion Facilitate or Prevent Problem Gambling?

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Abstract

Self-compassion is the tendency to respond to one's own mistakes and shortcomings with kindness rather than criticism. Self-compassionate individuals regard their mistakes with acceptance and non-judgment, maintain a balanced perspective and avoid dwelling excessively on their mistakes, and understand that everyone makes mistakes. Although self-compassion is known to be adaptive in coping with past mistakes, no research has examined its influence on risky decision-making in advance. An open and understanding disposition toward *anticipated* losses could either facilitate or prevent further development of problem gambling, and the direction of this relationship may depend on the severity of individuals' problem gambling. Across 5 studies, the present research aimed to examine (a) how self-compassion relates to risky decision-making in a gambling context, and (b) whether this relationship depends on the severity of problem gambling across individuals. These studies involved testing student and non-student participants (total $N = 725$), in laboratory and field settings, using correlational and experimental research designs, and multiple gambling tasks. These features of the research designs help to ensure that the findings are reliable, replicable, and appropriately generalized. The findings can be summarized across the studies with three broad observations about self-compassion and problem gambling: First, self-compassion has little relationship to gambling decisions by those with no signs of problem gambling already. Second, higher self-compassion is associated with taking more gambling risks among undergraduates with low-level or more severe problem gambling. Third, among casino patrons with low-level or more severe problem gambling – who in comparison with undergraduates represented a broader age range, higher frequency of problem gambling, and location in a typical setting for gambling activity – higher self-compassion was associated with taking fewer gambling risks. These findings have both theoretical and practical implications: Notably, the findings do not support the possibility that high self-compassion exerts a protective influence against the development of problem gambling in the general population, or that increased self-compassion should be considered an intervention target for primary or secondary prevention of problem gambling, particularly among young people or undergraduates. The findings do support the possibility that self-compassion may be used strategically in combination with other techniques both to enhance clinical assessment of problem gambling, and to provide social-environmental conditions for gambling that protect individuals from gambling-related harm.

Keywords: Self-compassion, Problem Gambling Severity Index, Iowa Gambling Task, Balloon Analog Risk Task.

Does Self-Compassion Facilitate or Prevent Problem Gambling?

Among the harms of problem or pathological gambling is the loss of self-worth that comes with losing control of the activity of gambling, and allowing it to overtake other moral and practical priorities in one's life (Yi, 2012). Loss of self-worth is an insidious harm because it undermines recovery efforts, absorbs self-regulatory resources from other tasks, and accelerates the relationship of problem gambling to other negative consequences, including spiraling financial losses, family/relationship problems, ill health, depression, and suicide (Williams et al., 2011).

Self-compassion has emerged relatively recently in psychological research as an adaptive trait, defined partly by the propensity to forgive oneself for one's mistakes (Neff, 2003). It differs from the familiar concept of self-esteem, notably by discouraging common defensive tactics that can make matters worse in the aftermath of mistakes or other negative life events. Thus, in such psychologically threatening circumstances as failures, interpersonal conflicts, or traumas, people who can avoid blaming themselves at least do not compound their problems and are often better able to respond adaptively to these problems (Neff, 2011).

Although there is little doubt of self-compassion's value in maintaining self-worth after a negative life event has occurred, its role in judgment and decision-making before such events is still largely unknown. Previous studies using prospective or experimental research designs have examined the influence of self-compassion on self-regulation of behaviour in several domains, such as relationship maintenance, disclosing secrets, health behaviours from tooth flossing to safe sex, academic coping, and eating. However, the role of risk and related judgments in each of these domains is complex and hard to infer from either self-reports or behavioural observations.

In the case of gambling, a decision-making style that forgives losses in advance could be associated hypothetically with either positive or negative consequences (e.g., Wohl, Salmon, Hollingshead, Lidstone, & Tabri, 2017). The positive scenario would be if self-compassion increased acceptance of initial losses, and thereby reduced risk-taking that would otherwise occur in the interest of compensating those initial losses with further wins. The negative scenario would be if self-compassion decreased the perceived harm in losing any and all risky bets, and thereby increased risk-taking instead. By means of a series of experimental studies of self-compassion and gambling play, the broad aim of this research is to determine whether, and under what conditions, the positive or negative scenario is what typically occurs.

Theoretical Framework and Specific Aims

Self-compassion is a topic of interest to positive psychology, or the scientific study of optimal human functioning (Sheldon, Fredrickson, Rathunde, Csikszentmihalyi, & Haidt, 1999). The theoretical framework of this research follows the calls by Kashdan & Steger (2011) and McNulty and Fincham (2012) for a contextual approach to positive psychology.

The contextual approach assumes that no personality characteristic is inherently positive or negative, and that any characteristic can have either positive or negative implications for well-being. The goal of research according to this perspective is to understand *when* and *how* certain characteristics, like self-compassion, may have either productive or counterproductive effects on outcomes related to well-being.

McNulty and Fincham (2012) offer 3 suggestions for the design of research according to this perspective:

- 1) To move beyond main effects and consider trait X context interaction effects on outcomes related to well-being;
- 2) To examine the distinct implications of psychological characteristics among both healthy/happy and unhealthy/unhappy people; and
- 3) To examine the implications of psychological characteristics over time.

The design of the present research adheres to all of these suggestions. Across 5 studies, it (a) considers interactions of trait self-compassion with measured and experimentally manipulated contextual variables; (b) compares the influence of self-compassion on gambling decisions among individuals with non-, low, moderate, or high severity of problem gambling; and, most importantly, (c) examines the influence of self-compassion on the quality of future decisions (over time and decision-making trials), rather than well-being in the aftermath of past decisions.

The practical implications of research following this design are apt to be contextualized or situationally dependent as well, rather than broadly encouraging or discouraging of self-compassion in potential problem gamblers. For example, clinical psychology has recently reclassified pathological gambling as a substance use disorder (Petry et al., 2014) and has begun to embrace treatments for these disorders based on developing mindfulness and self-compassion (Shonin et al., 2013). However, treatments for problem and pathological gambling that are modeled on the 12-step approach to other addictions are not immediately encouraging of self-compassion: They typically demand abstinence, wariness of one's character flaws, and seeking forgiveness from others before oneself. The present research is relevant to determining when, in the course of problem-gambling prevention or treatment, interventions should be oriented on fostering self-compassion vs. limiting its excess potential. The specific aims of the present research, as supported by the following literature review, are to determine: (a) if self-compassion influences gambling play in ways that will tend toward loss-avoidance or mounting loss, and (b) if either tendency depends on the severity of problem gambling and strength of gambling drive. In addition to the practical implications noted above, on a theoretical level, the results are expected to contribute to understanding how self-compassion relates to the anticipation of loss, as opposed to coping with an already-experienced loss.

Literature Review

Problem gambling directly afflicts about 2.4% of adults in Canada. This figure derives from averaging standardized past-year prevalence estimates for each of the Provinces, with weighting by each Province's percentage of the Canadian population (Williams, Volberg, & Stevens, 2012). Now classified in DSM-V as a substance use disorder (Petry et al., 2014), some essential features of problem gambling include impulsivity or loss of self-control, lying and isolation to hide the problem from others, and associated emotions of stress/anxiety, guilt/shame, and self-doubt. These features are reflected in diagnostic interviews and the problem gambling screens most widely used in population health surveys (Stinchfield et al., 2007).

Self-compassion and related interventions form part of a new wave of cognitive behavioral therapies, which cultivate mindful awareness of and an open, non-judgmental stance toward one's flaws and inadequacies. There is a clear conceptual articulation between the essential features of problem gambling noted above, and those of self-compassion, especially as a resource to bolster self-control and reduce stress and negative self-conscious emotions (Neff et al., 2007). For someone whose gambling and related problems are in the past, there is every reason to expect that self-compassion functions as a resource for successful adaptation. However, the role of self-compassion is less clear for those who continue to engage in gambling play.

What is self-compassion? Self-compassion describes the way a person treats him or herself in times of personal difficulty or pain. Individuals high in self-compassion treat themselves kindly in these circumstances – with warmth, acceptance, and caring – whereas individuals low in self-compassion treat themselves harshly and critically instead (Neff, 2003; Leary et al., 2007). The concept derives from the Buddhist psychological principle that compassion is an essential response to suffering – one's own and others' alike – which consists of being moved by that suffering to try to relieve it.

Like the Western notion of self-esteem, self-compassion involves positive feelings toward the self. However, differences between the two concepts soon appear in circumstances of personal difficulty that are likely to threaten these positive self-feelings (Neff, 2011). Because the basis of Western self-esteem is positive differentiation of the self from others, in terms of ability, social status, or other valued dimensions, self-esteem threats can provoke a variety of responses that are potentially costly to the individual and harmful to others in his or her community. These responses include

distorted cognitions, assertions of superiority, and even aggression to acquire or maintain an advantaged position for oneself over others (Crocker & Park, 2004).

Self-compassion does not encourage these responses. Rather, because the foundation of self-compassion is common humanity, or similarity between oneself and others in the face of difficulties, it eliminates the need for defensive posturing and winning back one's self-regard (Neff, 2011). Self-compassionate individuals in a threatening circumstance may feel that their pain (as with all pain) deserves to be treated with loving kindness, which they can and do exercise toward themselves.

The possibility that positive self-regard in the face of threats could be maintained without recourse to the costly pursuits of self-esteem has energized research on self-compassion for the past 15 years since Neff's (2003) original work to define and measure the concept in empirical terms. According to Neff (2003), self-compassion consists of three interrelated parts: self-kindness vs. self-judgment, feelings of common humanity vs. isolation, and mindful awareness vs. over-identification with one's problems. Past research has found these features to be accurately observable by close others (Neff & Beretvas, 2012) and to predict many aspects of adaptive functioning including less anxious responses to laboratory-induced stressors and improvements over time in psychological well-being (Neff, Kirkpatrick, & Rude, 2007).

Self-compassion also has trait-like and state-like aspects. As a stable feature of individuals' responses to personal difficulties or shortcomings, low self-compassion is thought to emerge from parenting styles and attachment dynamics characterized by low warmth, overprotection, rejection, or emotional abuse (Pepping, Davis, O'Donovan, & Pal, 2015). As a state that can also ebb and flow within individuals over time and across situations, previous research has shown that meditation practices, writing tasks, and activation of social support experiences will temporarily increase state self-compassion (e.g., Breines & Chen, 2012, 2013; Rowe, Shepstone, Cernelley, Cavanagh, & Milling, 2016).

Self-compassion and self-regulation of interpersonal goals, personal goals, and basic needs. Despite ample evidence that self-compassion is an asset to coping with chronic ongoing difficulties or past events, little research has examined how self-compassion affects probabilistic decision-making about future events. In the context of problem gambling, such decision-making is an essential part of whether negative life events occur, which will then demand a coping response.

As noted earlier, the hypothesis that self-compassion will inhibit risk-taking could be justified in the context of problem gambling, to the extent that self-compassion lowers individuals' arousal, maintains their affective balance, and reduces their need to restore their standing after a loss. However, the opposite expectation could also be justified to the extent that self-compassion reduces anticipated self-criticism or negative self-talk during decision-making, which would otherwise help to inhibit taking large risks. Indeed, past research on the related phenomenon of self-forgiveness supports this prediction, with a growing body of evidence that self-forgiveness undermines individuals' motivation to change problem behaviours, including smoking and problem gambling (Wohl & Thompson, 2011; Wohl et al., 2017). For instance, Squires and colleagues' (2012) study of Canadian undergraduates who showed at least 1 symptom of problem gambling on the DSM-IV checklist found that those with more symptoms expressed greater readiness to change their behaviour away from gambling, but this relationship was mediated significantly by the relative *absence* of self-forgiveness among the more symptomatic group. The ambiguity of self-compassion's influence at the critical moment of decision-making is important to resolve.

The ambiguity itself could also mean that self-compassionate thoughts and feelings are able to be swayed either toward risk or away from it by strong gambling motives. Motivational bias is well known to occur with other thoughts and feelings in the broader study of reasoning about risk (Kunda, 1990). Thus, the relationship of self-compassion to gambling decisions may depend on the level or type of gambling motivation individuals are experiencing at a given time.

Although no previous research on self-compassion has addressed gambling or probabilistic decision-making directly, self-compassion has been linked to self-regulation outcomes with an implied probabilistic decision-making process in other behavioural domains. With respect to *interpersonal goals* such as relationship and impression management, for instance, several studies have linked self-

compassion positively to admitting and fixing mistakes among individuals who are motivated to build or maintain social relationships. Among newlyweds and students in committed romantic relationships, Baker & McNulty (2011) found that self-compassion predicted both self-reported and observer-reported constructive relationship behaviours positively among men high in conscientiousness, but negatively among men low in conscientiousness. Neff and Beretvas (2012) also found that higher self-reported self-compassion predicted higher partner-reported positive behaviours (i.e., care, relatedness, autonomy, and acceptance), and lower negative behaviours (i.e., control, detachment, dominance, and aggression) in adult heterosexual couples.

Brion, Leary, and Drabkin (2014) found that individuals with HIV who were higher in self-compassion showed greater likelihood of disclosing their HIV status to others, and less inhibition due to shame in their willingness to practice safe sex and seek medical care. In a study by Werner and colleagues (2012), lower self-compassion differentiated individuals with social anxiety disorder from healthy controls, and among those with social anxiety disorder, it also predicted higher fear of negative social evaluation. In studies of gender nonconformity and stigmatizing conditions, both the propensity and the consequences of social risk-taking for well-being appear to vary between high and low self-compassionate individuals. For example, Keng and Liew (2017) found that self-compassion moderated the relationship between gender nonconformity and subjective well-being in a sample of Singaporean adults: More highly nonconforming individuals reported lower subjective well-being if they were lower in self-compassion, but higher levels of self-compassion were found to be protective against this trend. Wong, Mak, Liao, and Yu-Hsin's (2016) study of affiliate stigma experienced by the parents of children with autism spectrum disorders similarly found that self-compassion buffered the association between affiliate stigma and psychological distress. Together these studies suggest that the well-being consequences of exposure to social risks are neutral or positive for those with high self-compassion but negative for those with low self-compassion.

With respect to *personal goals*, Terry & Leary (2011) proposed that self-compassion promotes successful self-regulation of health behaviors via processes including lower defensiveness, buffering negative emotions that hinder self-regulation, and increasing adherence to medical advice. In line with this hypothesis, Sirois, Kitner, and Hirsch (2015) meta-analyzed 15 of their own data sets on the frequency of multiple common health behaviors, such as eating fruits and vegetables or well-balanced meals, getting regular exercise, and not missing sleep. The average $r = .25$ described the correlation of self-compassion to health behaviors across these data sets. Further analyses pointed to high positive affect and low negative affect as potential mediators to explain these health behavioural relationships with self-compassion.

Rowe and colleagues (2016) exposed naïve meditators to self-compassion priming or control conditions before an introductory session of mindfulness meditation training, and then measured their willingness to continue the training. Self-compassion priming resulted in higher willingness to continue. Self-compassion toward regretted experiences, personal weaknesses, moral transgressions, and failed test performances has been shown to predict both self-improvement motivation (Breines & Chen, 2012) and success (Zhang & Chen, 2016). Neff, Hsieh, and Dejitterat (2005) studied the relationship of self-compassion to academic achievement goals and found it to be associated with more mastery and less performance orientation, less fear of failure, and greater perceived competence. Students who believed they had failed a midterm showed more emotion-focused coping and less avoidance coping if they were higher in self-compassion.

Eating is a *basic need*, and a well-studied behavioural domain in which researchers have considered the role of self-compassion on adaptive perceptions before food is consumed. Mantzios and Wilson (2014) reported that an intervention combining mindfulness meditation with self-compassion assisted participants with weight loss, as compared with mindfulness meditation alone or no intervention, in a sample of military employees who were followed for 1 year. Kelly and Stephen (2016) conducted a multi-level study of self-compassion, eating, and body image in 92 female college students over 7 days. They found that self-compassion influenced eating and body image favourably, both in comparing individuals with relatively high or low self-compassion, and in accounting for day-to-day variation in the study variables within individuals. Kelly and Tasca (2016) provided further

evidence of a within-person cycle of shame and eating pathology, in a sample with eating disorders, which was helpfully interrupted by increases in self-compassion.

In summary, many previous studies suggest that self-compassion aids self-regulation toward positive personal and interpersonal goals, and basic need satisfaction, making it easier for individuals to acknowledge need for improvements, and easier to persist in the face of difficulty, fear, or criticism from others. The research by Kelly and Tasca (2016) is especially important in showing that self-compassion can serve to disrupt negative and pathological decision-making processes that are otherwise driven forward by shame: Problem gambling, particularly when it is acknowledged to be a problem, could be an example of this type of process, and self-compassion might facilitate the admission that one has a gambling problem in the first place.

Equally apparent from this review, however, is that many of the positive personal and interpersonal goals that are supported by high self-compassion require taking risks, rather than avoiding them. Consider, for example, disclosing one's HIV status, breaking with gender norms, and trying again or investing in more training where one has previously failed to learn a new skill. Problem gambling, particularly when it is experienced as a positive personal or interpersonal goal to have fun or win money (Schellenberg & Bailis, 2018), could be an example of this type of process, too. Indeed, unacknowledged problem gambling mimics several features of positive self-regulation that could be accelerated by self-compassion. Gambling may, for example, give participants the appearance of being susceptible to skill, strategy, or sheer persistence, and it may involve tolerating some difficulty, fear, and self-doubts or criticism from others, in order to prolong play and experience a win.

Overview of Studies

Given the aims and context provided by this review, the goal of all of the studies reported here was to examine how risk-prone or risk-averse individuals' decision-making would be over a series of trials in a gambling task, as a function of their previously measured self-compassion. Because of this common underlying goal, many methodological features were shared across the present studies.

All of the present studies used one of two previously validated gambling tasks to assess risky decision-making: The Iowa Gambling Task (Bechara, Damasio, Gamasio, & Anderson, 1994), or the Balloon Analog Risk Task (Lejuez, Read, Kahler, et al., 2002). Replication with two tasks ensures the results are not specific to either task.

By also pre-measuring the severity of participants' problem gambling, the present studies could compare the relationship of self-compassion to gambling decisions among participants with no risk of problem gambling, vs. those with any signs of risk. Study 1 provided the initial test of these relationships in a lab setting with an undergraduate sample. Two follow-up studies sought to replicate and extend Study 1, in a field setting with a community sample (Study 2), and in a lab setting examining self-compassion both as an experimental and as a measured independent variable (Study 3). Studies 4 and 5 focused on individuals at higher risk of problem gambling. Within this subgroup, these studies further attempted to vary the level (Study 4) and quality (Study 5) of motivation toward the gambling task, using experimental manipulations in the immediate gambling situation. The aim of these studies was to determine whether the influence of self-compassion on gambling decisions depended on these motivational conditions.

Sample size for each of these studies was determined by feasibility considerations rather than statistical power. However, the feasible samples were consistently expected and found to be larger than that which the standard criterion of 80% power would entail under assumptions of a small-to-medium effect size and $\alpha = .05$ (approximately $N = 44$, using G*Power 3.1; Faul, Erdfelder, Buchner, & Lang, 2009), for both the overall and planned subsample analyses presented here.

Study 1

Method

Participants. Participants in Study 1 were undergraduates drawn from the Introductory Psychology participant pool at the University of Manitoba. These participants completed pre-screening measures of self-compassion and problem gambling severity (described below), from several weeks up to 6 months before recruitment to the present studies, via paper-and-pencil survey administration in a classroom setting.

Participants were selected for recruitment on the basis of (a) having provided complete responses in the valid range to all items of the Self-Compassion Scale (Neff, 2003) and Problem Gambling Severity Index (Ferris & Wynne, 2001), and (b) having agreed and provided phone/email information to be contacted again to participate in future research. Eligible participants were recruited primarily by phone. They were asked during recruitment if they were trying to avoid gambling, and were advised against participating if so.

One hundred seventy-nine undergraduates participated in exchange for credit in their Introduction to Psychology course. Three who did not follow instructions on the Iowa Gambling Task (see below) were dropped from subsequent analyses. As recorded in the pre-testing survey, these students ranged in age from 17 – 36, with $M = 19.9$ and $SD = 2.7$. They included 101 who identified as men, 71 as women, and 7 who declined to state a gender. The latter were dropped from subsequent analyses involving gender. The sample was ethnically diverse, including 37% who identified as White/European, 15% as Aboriginal/First Nations, 15% as Black, and 10% as Filipino, among members of other ethnic groups.

For this study, the participant sample was stratified so that approximately equal numbers of participants were recruited with pre-test scores on the PGSI of 3 or more ($n = 94$), or less than 3 ($n = 85$), for the additional in-lab procedures. Both groups were balanced for gender to avoid confounding gender with problem gambling severity.

Self-Compassion. In pre-testing, participants completed the long form of Neff's (2003) Self-Compassion Scale. Under the title "How I typically act toward myself in difficult times," participants read a series of statements and indicated, for each one, how often they had behaved in the stated manner, using a response scale from 1 "Almost never" to 10 "Almost always." Twenty-six statements followed, tapping 6 dimensions: *self-kindness* (e.g., "I'm kind to myself when I'm experiencing suffering"), *self-judgment* (e.g., "I'm disapproving and judgmental about my own flaws and inadequacies"), *common humanity* (e.g., "When things are going badly for me, I see the difficulties as part of life that everyone goes through"), *isolation* (e.g., "When I'm really struggling, I tend to feel like other people must be having an easier time of it"), *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's wrong"). The analyses presented here, as recommended by Neff et al. (2018), use the total self-compassion score found by first reverse-scoring the negative subscale items (i.e., self-judgment, isolation, and over-identification) and then averaging across the whole set of items.

The self-compassion scale requires an 8th grade reading level and is thus appropriate for the age range and education level of the present sample. Beginning with Neff's (2003) original developmental work, the scale has been validated extensively in undergraduate samples like the present one, through exploratory and confirmatory factor analyses, tests of temporal stability and discriminant and convergent validity (e.g., with existing measures of social desirability, perfectionism, and self-criticism), and prediction of mental health (e.g., with existing measures of depression, anxiety, and life satisfaction). The scale's reliability in the present sample was very good, with $\alpha = .88$.

Problem Gambling Severity Index (PGSI). Also in the pre-testing survey, participants completed the 9-item form of the PGSI (Ferris & Wynne, 2001). This self-assessment refers to the past 12 months, in which participants are asked how often they engaged in gambling behaviours or experienced related consequences. The 9 items reflecting these behaviours and consequences (e.g., betting more than one could afford to lose, or having health problems, including stress or anxiety,

caused by gambling) are answered with the response options 0 “never”, 1 “sometimes,” 2 “most of the time,” or 3 “almost always.” The total score is typically interpreted with the cutoffs of 0 = non-problem gambling, 1-2 = low level of problems, 3 = moderate level of problems, and 8 or above = problem gambling.

The PGSI was developed in a Canadian context and is intended for use in population surveys to evaluate problem gambling on a continuum. The scale has been validated internationally in large samples (see e.g., Orford, Wardle, Griffiths, Sproston, & Erens, 2010; Miller, Currie, Hodgins, & Casey, 2013; Sanscartier, Edgerton, & Roberts, 2018), both in terms of its correlation with other continuous survey measures and in terms of its classification accuracy (i.e., sensitivity and specificity of identifying cases with and without the condition as determined by DSM-IV clinical interview assessments of problem gambling).

In the present research, the ability to categorize participants into gambling subtypes is important for the purpose of testing interactive effects with self-compassion. However, the relatively rare clinical manifestation of problem gambling (PSGI = 8 or above, reported by 11% of the present sample) is not a required or desirable threshold to test the theoretical possibility that self-compassion functions differently among those with relatively low vs. higher motivational and behavioural tendencies toward problem gambling. Indeed, it is important to know, from a practical prevention and treatment perspective, whether such differences can be detected at a lower threshold of risk for problem gambling.

Gambling Task. This study used the Iowa Gambling Task (IGT; Bechara et al., 1994) to assess risky decision-making. The IGT gives participants an imaginary bank of \$2000 and 4 virtual decks of cards (shown on-screen). On each trial, participants choose a card from one of the decks and receive immediate feedback on the amounts they have won. Some draws require a penalty to be paid as well, and so the participants’ aim is to obtain the highest net gain from the initial bank of \$2000. The decks are constructed so that two of them are advantageous in the long run: Over the 60 cards in each deck, they present consistently moderate rewards and low penalties. The other two decks are disadvantageous in the long run: they present higher rewards but higher penalties also.

In the instruction set and software application used here, as published by PAR (Becharra, 2007), a variable green cash bar at the top of the screen provides visual feedback on the running total of dollars won or lost, relative to a stable red bar that illustrates the amount of the initial loan. After 5 blocks of 20 trials, scores can be computed for each participant that reflect overall performance (i.e., the total number of advantageous minus disadvantageous selections over 100 trials), and rate of learning (i.e., the relative frequency of advantageous to disadvantageous selections in each block). These summary scores are produced automatically by the PAR software application, and were entered manually to an SPSS file for analysis in the present research. Two participants who completed 85 and 95 trials, respectively, received proportionately estimated scores out of 100, rounded to the nearest whole number, based on the substantial majority of trials they completed. Accuracy of data entry was checked through double entry by different individuals into separate files, electronic file comparison to detect discrepancies, and checking discrepant entries against the original report.

The IGT was originally developed as a neuropsychological assessment of patients with frontal lobe lesions and associated impairment of executive function. It has been used in gambling research to distinguish pathological and problem from non-problem gamblers, and to represent a central pathological feature: i.e., failing to recognize or act upon potential gambling losses, and focusing myopically instead on potential gambling wins. In the present research, a lower score on the IGT indicates higher willingness to take gambling risks during the task, and continued pursuit of high-risk options after an initial loss.

Procedures. Upon arrival to the Psychology building, participants were greeted by a research assistant who carried out the in-lab procedures. The research assistants conducting the in-lab procedures did not know the PGSI status of the participants, nor did the participants know that any of their pre-test scores were specifically related to this research. The in-lab procedures included the IGT and an exploratory follow-up questionnaire (not reported here but available from the author on request). Participants completed these procedures individually at a computer workstation with

partitions for privacy, with the research assistant present, and a maximum of 3 other participants at the same time. All of the present study procedures were approved in advance by the University of Manitoba Psychology/Sociology Research Ethics Board. All participants provided written informed consent prior to participation in this research, and received written feedback/debriefing afterward.

Results

The goals of the planned data analyses were to model the relationship between self-compassion and IGT performance, and to test for possible differences in this relationship between participants with low-risk *versus* those with moderate- or high-risk scores on the PGSI. Several preliminary analyses were undertaken (a) to identify potential covariates that should be controlled in the main analysis, (b) to determine the shape of the learning curve over these trial blocks in the general case, and (c) to evaluate assumptions of linearity, normality, and heteroscedasticity that are applicable the planned type of regression analysis. All analyses were performed in IBM SPSS version 25.

Preliminary analyses. Table 1 reports descriptive statistics and correlations among the study variables. The results indicate two significant relationships: Participants higher (as compared with lower) in self-compassion more commonly reported no symptoms of problem gambling, and women compared with men showed lower performance on the IGT. Participants' PGSI categorization and gender were both included in the main analysis, with the PGSI variable considered as a factor in testing the hypotheses of this research, and gender considered as a covariate.

Table 1
Descriptive Statistics and Correlations Among the Variables in Study 1.

Variables	1.	2.	3.	4.	5.
1. Self-Compassion	3.44 (1.22)				
2. PGSI Group (1 = Low-level or More)	-.19**	0.56 (0.50)			
3. Age	.08	.02	19.74 (2.40)		
4. Gender	-.14	-.04	.08	0.42 (0.50)	
5. IGT Performance	-.08	-.05	-.02	-.20**	4.47 (9.32)

N = 168. * $p \leq .05$, ** $p \leq .01$. Means and standard deviations are reported on the diagonal, with correlations below.

IGT learning curve. Because the choice of an advantageous or disadvantageous card deck on the first trial of the IGT is inherently random for all participants, but subsequent trials are informed by the feedback from all of the previous selections a participant has made, it is assumed that change in the net number of advantageous deck selections will follow the pattern of a learning curve.

To confirm this assumption, the net number of advantageous minus disadvantageous deck selections in each block of 20 trials served as the dependent measure in a two-factor mixed ANOVA, with trial block as the 5-level repeated factor, and problem gambling severity (0 or no risk, vs. 1+ or some risk) as the 2-level grouping factor. The omnibus effect of trial block was significant in this analysis, $F(4, 684) = 33.79$, $p < .001$, $\eta^2 = .17$, indicating that performance varied across the trial blocks. Within this type of analysis, a linear single-*df* contrast tests whether the amount of change in performance across the trial blocks differs from zero, and the quadratic contrast tests whether the rate of change between the blocks differs from zero as well. Both of these single-*df* contrasts were

significant: linear, $F(1,171) = 65.36, p < .001, \eta^2 = .28$, and quadratic, $F(1,171) = 14.77, p < .001, \eta^2 = .08$. These findings, as further illustrated in Figure 1, suggest that for the typical participant, performance on the IGT improved from the first trial block to the last, and most of this learning was accomplished in the first 3 trial blocks.

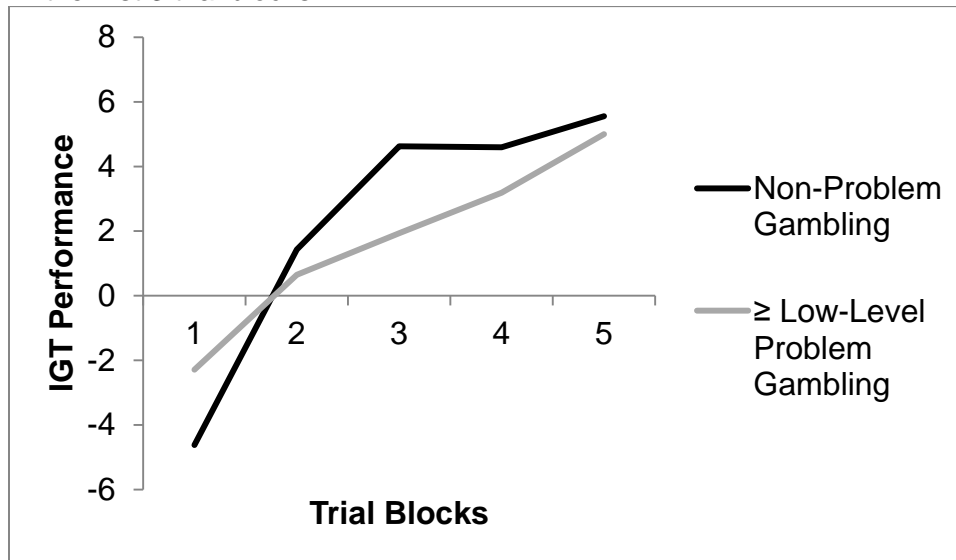


Figure 1. Net advantageous-minus-disadvantageous deck selections over 5 trial blocks of the Iowa Gambling Task, among low- and moderate- (or higher-) scoring participants on the Problem Gambling Severity Index in Study 1 ($N = 179$).

Figure 1 displays the IGT learning curves, plotted separately for participants with non- vs. those with low-level or more severe problem gambling. Findings from the mixed ANOVA further revealed that the overall learning pattern was qualified by significant problem-gambling level X trial-block interactions, considering both the omnibus test of this interaction, $F(4, 684) = 2.47, p < .05, \eta^2 = .01$, and the quadratic contrast test of this interaction, $F(1, 171) = 7.40, p = .007, \eta^2 = .04$. The latter test, as shown in Figure 1, suggests that participants with non-problem gambling scores on the PGSI improved substantially faster than those with low-level or more severe problem-gambling scores, especially in the first 3 blocks of trials on the IGT. These findings essentially validate the PGSI, with respect to prediction of future behaviour on an established gambling task.

Effects of self-compassion. The critical test of self-compassion's influence applies to participants' IGT performance after they have had an opportunity to learn the task. Therefore, the dependent variable for this analysis was calculated by summing participants' IGT performance scores (i.e., net advantageous deck-selections) over the 4th and 5th trial blocks. Preliminary analyses showed that participants' gender correlated significantly with this performance measure as well; therefore, gender was included in the model as an independent predictor.

Due to the scaling of self-compassion as a continuous predictor of IGT performance, data were submitted to a multiple regression analysis, using the PROCESS Procedure for SPSS Version 3.3 (Hayes, 2017). This procedure allows for the testing of direct and interactive effects. In this case, the analysis was intended to test the potential interaction between participants' self-compassion and PGSI scores. Dummy coding of categorical variables is shown in Table 1, and self-compassion scores were mean-centered prior to analysis, as recommended by Jaccard and Turisi (2003).

Table 2

Multiple Regression Analysis of IGT Performance: Direct and Interactive Effects of Gender, PGSI Group, and Self-Compassion.

Model	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% <i>CI</i>
Intercept	6.88	1.25	5.49	<.0001	-4.40, 9.36
Gender (1=women)	-4.55	1.44	-3.17	.002	-7.40,-1.72
PGSI group (1 = low-level or more)	-1.43	1.43	-0.99	.32	-4.26, 1.41
Self-Compassion	0.46	0.87	0.53	.60	-1.25, 2.17
PGSI X Self-Compassion	-2.60	1.18	-2.21	.03	-4.92,-0.27

Note. Model $R^2 = .09$, $F(4, 163) = 3.80$, $p = .006$. Interaction $\Delta R^2 = .03$, $F(1, 163) = 4.87$, $p = .029$.

As shown in Table 1, while controlling for gender, the direct effects of participants' PGSI group and self-compassion were qualified by a significant interaction between these predictors. To interpret the interaction, the simple slopes of IGT performance on self-compassion were examined in each PGSI group. Among participants with non-problem gambling scores, IGT performance was not significantly related to participants' self-compassion, $b = 0.46$, $t = .53$, $p = .60$, 95% CI (-1.25, 2.17). However, among those with low-level or more severe problem gambling scores, IGT performance was significantly negatively related to participants' self-compassion, $b = -2.14$, $t = -2.68$, $p = .008$, 95% CI (-3.72, -0.56). These slopes are further illustrated in Figure 2.

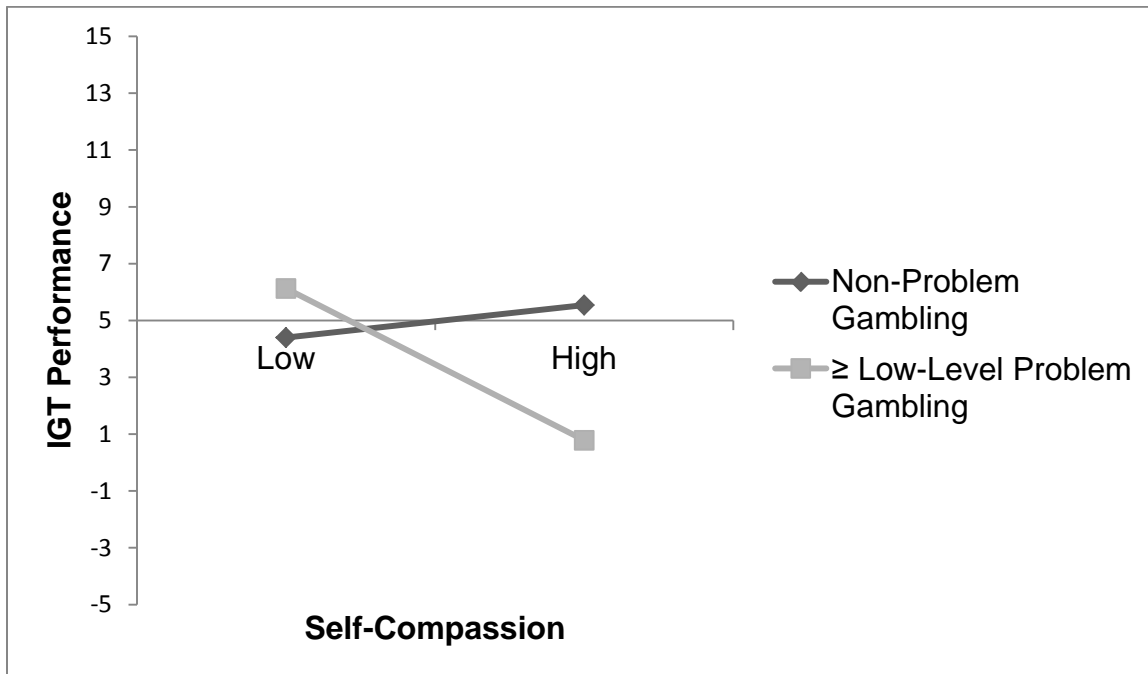


Figure 2. Simple slopes of IGT performance on self-compassion among participants with low vs. moderate and higher problem gambling severity. The horizontal axis crosses at approximately the sample mean of IGT performance, for which the ± 1 standard deviation range is shown. Low and high self-compassion correspond with the ± 1 standard deviation range of this predictor.

From Figure 2, it is apparent that among participants at any risk of problem gambling, higher self-compassion predicts significantly poorer performance on the IGT, indicating more risky decision-making or more frequent card selections from the high-reward/high-penalty decks. This pattern holds over the 4th and 5th trial blocks, after our preliminary analyses demonstrated learning of the task by most participants. Because gender was controlled in this analysis, both statistically and through sample selection, the finding is not attributable to the gender composition of the PGSI groups.

Discussion

The present study showed that in the context of participants with low-level or more severe problem gambling, those higher in self-compassion made significantly riskier choices on the IGT. Self-compassion was not associated with greater risk-taking in all participants: Those at no risk for problem gambling showed similar performance on the IGT, regardless of whether they were high or low in self-compassion. Among those at any risk, however, self-compassion predicted continued pursuit of the high-reward/high penalty options for more trials of the IGT.

From a theoretical standpoint, the results imply a decision-making process whereby potential problem gamblers who are higher in self-compassion will forgive a series of losses or penalties during the task, rather than just the first. However, this decision-making process is inferred and was not directly observed in the present research. Another theoretical implication is that self-compassion, albeit a broadly positive and not situationally specific disposition toward self-care, still does not override the risk-taking propensity of potential problem gamblers. In other words, far from suppressing the expected differences in risk-taking between non-problem and potential problem gamblers, the present results suggest that these differences become larger at progressively higher levels of self-compassion. This finding corresponds closely with the previous research by Squires et al. (2012), which found that an absence of self-forgiveness predicted motivation to quit gambling among those with the highest levels of problem gambling symptoms.

From a practical standpoint, when considering young adults who show any signs of developing gambling problems, the present results suggest that prevention should take a different course than to encourage self-compassion, which may lead these young adults into error. However, the present findings are limited in several ways. These findings establish a reliable statistical association of self-compassion with increased risk-taking in some conditions, but not a cause-and-effect relationship between the two. The findings are also limited with respect to their generalizability. The demographic composition of the participant sample, the laboratory setting for performance assessment, and the particulars of the IGT as a gambling task or game are all important factors to consider before the present findings are applied. Study 2 was designed to address the questions of sample and setting that were raised in Study 1, by essentially replicating this study's procedures on a casino floor with casino patrons as participants.

Study 2

Participants in Study 2 were patrons of the McPhillips Station and Club Regent Casinos in Winnipeg. They were recruited and tested on site at these casinos using a paper-and-pencil survey to capture the personality measures of interest, and laptop computer administration of the IGT.

Method

Participants. Two hundred and forty casino patrons participated in exchange for a \$10 gift card to coffee or restaurant chains. The participants ranged in age from 18-85, with $M = 54$ and $SD = 17.7$. They included 120 who identified as male, 115 as female, and 5 who declined to state a gender. Fifty-seven percent identified their ethnicity as White/European (although an additional 14% wrote in either "Canadian" or a specific European ancestry), with the next largest 12% Aboriginal/First Nations, 8% Filipino, and 5% Métis, among other ethnic groups. Educational attainment ranged from less than high school (9%), to completed post-secondary (46%), with about equal numbers in the completed high school (21%) and some post-secondary (23%) categories. Household pre-tax income was reported in ranges from below \$20,000 (12%) to \$100,000+ (12%), with the median in the \$50,000 range. A majority of participants (54%) reported gambling more often than once per month, and 15% reported gambling more often than once per week. Thirty-nine percent of participants had a PGSI score of 3 or higher (moderate-level problems), and 12% had PGSI scores of 8 or higher (problem gambling). The wide range of PGSI scores in this sample allowed for multiple subgroup comparisons.

Measures and procedures. With permission and assistance from local management, temporary research stations were set up at each of the 2 major casinos in Winnipeg operated by

Manitoba Liquor and Lotteries during the summer of 2016. The stations consisted of a table and chairs, with two laptops and paper supplies for administering informed consent and data collection procedures, a banner indicating the University of Manitoba and Psychology affiliation of this research, and additional signage advertising the incentive of a \$10 gift card for local coffee or restaurants in exchange for participation. A team of 2 research assistants ensured that one was always available to run the procedures, while the other took inquiries and also approached those who were not employees and not engaged in gambling activities at the time, inviting them to participate. The schedule was designed to sample all days of the week and hours of casino operation.

After providing written informed consent, participants completed a questionnaire that included the demographic characteristics noted above, the PGSI (Ferris & Wynne, 2001), and a 12-item short form of the Self-Compassion Scale (Raes, Pommier, Neff, & Van Gucht, 2011). Reliability of the 12-item Self-Compassion Scale was $\alpha = .78$ in the present sample. Supplementary measures of participants' favourite gambling activities, time spent on these activities, and passion for gambling were included after the key measures of interest to this research and are reported elsewhere (Schellenberg & Bailis, 2018). Following the questionnaire, participants completed the IGT using a laptop computer, after which they were thanked, compensated, and debriefed. All materials and procedures of this study were approved in advance by the University of Manitoba's Psychology/Sociology Research Ethics Board.

Results and Discussion

Twenty-one participants who did not follow instructions or completed fewer than 4 trial blocks of the IGT were excluded from further analyses. One participant who completed 91 out of 100 trials received an estimated score for the final block. Preliminary analyses of the IGT learning curve, as a function of trial blocks and PGSI group, produced nearly identical results as in the previous study and are not further elaborated here.

Table 3 reports the results of preliminary analyses to evaluate descriptive statistics and correlations among the study variables. Gender was not significantly related to IGT performance in this analysis but was retained as a covariate in the main analysis to maintain comparability of the analytic model across studies. IGT performance showed no significant correlations with age or income level in the present sample. Age was significantly positively associated with self-compassion but was not retained as a covariate as it had no significant relationship to the dependent variable.

Table 3

Descriptive Statistics and Correlations Among the Variables in Study 2.

	1.	2.	3.	4.	5.	6.	7.
1. Self-Compassion	3.43 (0.68)						
2. PGSI Group (1 = Low-level or More)	-.07	0.66 (0.47)					
3. Age	.34**	-.16*	53.47 (17.91)				
4. Gender (1 = Women)	.01	-.001	-.001	0.48 (0.50)			
5. Income	-.03	-.13	-.04	-.02	3.54 (1.52)		
6. Education	.01	.04	-.16*	-.07	.32**	3.11 (0.99)	
7. IGT Performance	.15*	-.16*	-.001	-.09	.06	.13	2.73 (8.60)

Note. *Ns* range from 214-218 using pairwise deletion of cases with missing data, except regarding income where *Ns* range from 204-205. * $p \leq .05$, ** $p \leq .01$. Means and standard deviations are reported on the diagonal, with correlations below.

The principal aim of the study was to replicate the main analysis of Study 1 in a relevant field setting and sample. Table 4 shows the results of this analysis, in which indicator coding is used to represent the presence of any signs of problem gambling (vs. none).

Table 4

Multiple Regression Analysis of IGT Performance Among Casino Patrons in Study 2.

Model	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% <i>CI</i>
Intercept	8.38	5.07	1.65	.10	-1.61, 18.37
Gender (1=women)	-1.29	1.15	-1.12	.26	-3.57, 0.98
PGSI group (1 = low-level or more)	-17.13	6.28	-2.73	.007	-29.51, -4.76
Self-Compassion	-0.87	1.43	-.61	.54	-3.57, 0.98
PGSI X Self-Compassion	4.19	1.78	2.35	.02	0.68, 7.70

Note. Model $R^2 = .08$, $F(4, 209) = 4.44$, $p = .002$. Interaction $\Delta R^2 = .02$, $F(1, 209) = 5.54$, $p = .02$.

These results show a significant interaction between self-compassion and the presence of any signs of problem gambling. On further probing of the simple effects of self-compassion in each risk condition, we found no significant association between self-compassion and IGT performance among participants with no signs of problem gambling ($b = -.87$, see Table 2), but a significant and *positive* association among those with any such signs, $b = 3.32$, $t(209) = 3.15$, $p = .002$. Thus, only among potential problem gamblers in this sample and setting, self-compassion was associated with better performance on the IGT.

In this study, it was further possible to stratify the sample into the 4 standard categories of problem gambling severity (Ferris & Wynne, 2001), consisting of those with PGSI scores of 0 or no risk ($n = 82$), 1-2 or low risk ($n = 65$), 3-7 or moderate risk ($n = 63$), and 8+ or high risk of problem gambling ($n = 30$). Table 5 shows results of this analysis, which used indicator coding to represent the associations of IGT performance with each problem gambling category above no risk .

Table 5

Multiple Regression Analysis of IGT Performance with Low, Moderate, and High Categories of Problem Gambling Severity.

Model	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% <i>CI</i>
Intercept	5.39	1.13	4.79	<.0001	3.17, 7.61
Gender (0 = men, 1=women)	-1.30	1.16	-1.12	.26	-3.59, 0.99
Self-Compassion (SC)	-0.87	1.43	-0.61	.54	-3.69, 1.95
Low Risk	-3.14	1.50	-2.10	.04	-6.09, -0.19
Moderate Risk	-2.20	1.53	-1.44	.15	-5.21, 0.82
High Risk	-3.29	1.90	-1.73	.09	-7.03, 0.45
SC*Low Risk	4.47	2.26	1.98	.05	0.01, 8.94
SC*Moderate Risk	2.85	2.20	1.30	.20	-1.49, 7.19
SC*High Risk	7.09	2.85	2.49	.01	1.48, 12.7

Note. Model $R^2 = .09$, $F(8, 205) = 2.59$, $p = .01$. Interaction $\Delta R^2 = .03$, $F(3, 205) = 2.58$, $p = .054$.

This supplementary analysis adds to the previous one that the positive relationship of self-compassion to IGT performance is found to be reliable even among participants at the lowest level of problem gambling. Furthermore, this relationship is shown to be strongest among those at the highest level, $b = 6.22$, $t(205) = 2.53$, $p = .01$.

The present findings add to those of Study 1 in two main ways. First, the present findings show again that self-compassion is relevant to predicting gambling decisions by individuals with at least some presentation of problem gambling. Second, the findings suggest that, within this relevant subpopulation, self-compassion does not always lead to a preference for risky decision-making on the IGT. Rather, it predicted adaptive avoidance of risk on this task in this casino-based sample and setting.

Study 3

The aim of Study 3 was to vary self-compassion experimentally. To this end, participants were randomized to self-compassion or control conditions of a writing task, prior to engaging in the IGT. All materials and procedures of this study were identical to those of Study 1, except as noted below.

Method

Participants. One hundred forty undergraduates participated in exchange for credit toward their Introduction to Psychology course. Two participants completed fewer than 3 blocks of the IGT and were dropped from further analyses. Participants ranged in age from 17 – 35, with an average of 19 years ($SD = 2.5$). Seventy-one (51%) identified as male, 65 (46%) as female, and 4 (3%) declined to state a gender. The ethnic identities of participants included 52% from a White/European background, 10% Black, and 9% Filipino, among other ethnic groups. On the PGSI, 30% of participants had scores of 3 or more (moderate), and 10% had scores of 8 or more (high).

Materials and procedures. All materials and procedures of this study were approved in advance by the University of Manitoba Psychology/Sociology Research Ethics Board. Only the unique materials and procedures of this study are reported here. After providing informed consent, participants received an envelope containing written instructions for a writing task. This task, adapted from Breines and Chen (2012), first asked participants to write 1-2 sentences on what they considered to be their biggest personal weakness or shortcoming. In the self-compassion condition, this elicitation was followed with a request for the participants to write a paragraph to themselves expressing compassion and understanding regarding the weakness they had just described. In the control condition, the request was to describe a hobby they enjoyed in their spare time. Participants were assigned to either the self-compassion or the control condition randomly, and the use of an envelope to distribute and return the writing task ensured that the experimenter did not know which

task the participants had received. After the writing task, participants completed a brief questionnaire about their feelings “right now.” This questionnaire, also adapted from Breines and Chen (2012), was designed to assess participants’ state self-compassion (4 items, $\alpha = .74$, e.g., “I’m treating myself with kindness and compassion”) and self-improvement motivation (7 items, $\alpha = .78$, e.g., “I want to learn and improve myself”), immediately before doing the IGT.

Results and Discussion

Preliminary analyses focused on the effectiveness of the writing task to elicit feelings of self-compassion. Specifically, independent *t*-tests compared the self-compassion and control conditions in regard to participants’ state self-compassion, state self-improvement motivation, and performance in the last two blocks of the IGT. All of these *t*-tests were non-significant, indicating that the experimental manipulation produced no significant variation in either feelings of self-compassion or IGT performance.¹ Therefore, further analyses reverted to an independent replication of Study 1.

Table 6
Replication of Study 1 Analysis in an Independent Undergraduate Sample in Study 3.

Model	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% <i>CI</i>
Intercept	6.73	1.79	3.77	<.001	3.20, 10.26
Gender (1=women)	-5.57	1.86	-3.00	.003	-9.25, -1.89
PGSI group (1 = low-level or more)	-1.94	1.84	-1.06	.29	-5.57, 1.69
Self-Compassion	-0.06	.91	-0.06	.95	-1.85, 1.74
PGSI X Self-Compassion	-2.48	1.26	-1.97	.052	-4.97, 0.02

Note. Model $R^2 = .10$, $F(4, 129) = 3.61$, $p = .008$. Interaction $\Delta R^2 = .03$, $F(1, 129) = 3.86$, $p = .052$.

As shown in Table 6, the present study also found, and controlled for, a significant trend for female participants to have a lower net score than male participants on the last two trial-blocks of the IGT. The findings also show an interaction between self-compassion and problem gambling status that is on the cusp of statistical significance ($p = .052$). As in Study 1, analysis of simple slopes confirmed that self-compassion had no significant relationship to IGT performance among non-problem gamblers ($b = -.06$, see Table 6), but a significant negative relationship to IGT performance among participants with low-level or more severe problem gambling, $b = -2.53$, $t = -2.90$, $p = .004$, 95% *CI* (-4.27, -0.80).

In sum, the present findings demonstrate the replicability of our Study 1 findings in an independent sample of undergraduates. The primary aim to manipulate self-compassion experimentally through a writing task did not succeed. Thus, the question whether self-compassion has a cause-and-effect relationship with risky decision-making still remains for future research. It is important to note, however, that the size of the present sample was adequate in terms of statistical power; therefore diversity of the sample in terms of problem gambling symptoms is more likely than sample size to explain why the self-compassion writing task did not elicit significantly stronger feelings of self-compassion in the sample as a whole. As noted above, this manipulation showed similar effects on self-improvement motivation as in past research, but only among non-problem gamblers in the present sample. The reduced effectiveness of this manipulation among at-risk or problem gamblers, though unexpected, presents another important question for future intervention-oriented research with this population: i.e., why might it be harder to induce self-compassion in this group? To

¹Regarding the replicability of Breines and Chen’s (2012) original findings, it is important to note that we also tested the dependent measures of state self-compassion and self-improvement motivation in a 2 (Condition) X 2 (PGSI Subgroup) ANOVA design. Results of these analyses showed similar effects to those reported by Breines and Chen (2012) among non-problem gamblers only: i.e., significantly higher self-improvement motivation following the self-compassion writing task ($M = 6.3$, $SD = 0.6$) as compared with the control writing task ($M = 5.7$, $SD = 0.9$), $F(1, 132) = 9.29$, $p = .003$. Thus, the difference in our overall results appears to be due to the inclusion of a large percentage of participants with some indications of problem gambling.

this end, participants' narrative responses to the self-compassion writing task can be analyzed qualitatively, on an exploratory basis, to allow comparisons between low and high-scoring participants on the PGSI.

Study 4

Given the evidence of Studies 1-3 that self-compassion relates to risky decision-making primarily among individuals with at least some indications of problem gambling, the remaining studies focused on this subgroup and examined the further role of motivational contingencies bearing on their performance of gambling tasks. Specifically, Study 4 focused on the *level* of task motivation and involved randomizing participants to normal or elevated motivational conditions. This study also employed a different gambling task to assess participants' preferences for taking or avoiding risks.

Method

Participants. Seventy-six undergraduates with complete information on the self-compassion scale and PGSI scores of 2 or higher, as determined by pre-screening, participated in exchange for course credit in Introductory Psychology. The participants ranged in age from 17 – 44 years, with 66% identifying as male, 28% as female, 6% as another gender or declining to state. The ethnic composition of the sample was 45% White/European, and 16% Filipino, with smaller percentage representation by members of diverse groups. Three participants were dropped from further analyses: One had an implausibly low self-compassion score more than 3 standard deviations below the sample mean, and 2 were more than 3 standard deviations older than the sample mean age of 20 years. The PGSI inclusion-criterion for this study was meant to be 3 or higher, in line with the instrument-standard for at least moderate problem gambling. A coding error resulted in 20 participants with scores of 2 being admitted to the study. However, all of the participants in this study exceeded the criterion of at least low-level problem gambling that was used to define the symptomatic subgroup of participants in the other studies of this report.

Materials and Procedures. All materials and procedures of this study were approved in advance by the University of Manitoba Psychology/Sociology Research Ethics Board. Only the unique materials and procedures of this study are reported here. In order to manipulate participants' level of motivation prior to playing a gambling game, a confederate of the experimenter attended each session and posed as a fellow participant. At the start of each session, both were seated in front of a computer where they completed the informed consent procedure. Following the explanation of study procedures, including the gambling game that participants would play, the experimenter explained that one of the computers was not working, and the two would have to take turns playing the game, using random selection to determine who would go first. In the baseline motivation condition, the true participant was selected to go first. In the elevated motivation condition, the confederate was selected to go first, forcing the true participant to wait for the game while watching the confederate play. The forced delay was expected to increase participants' drive to play the game when his/her turn finally came. The confederate adhered to pre-scripted comments to be directed to the participant on pre-selected trials of the game, expressing some enthusiasm, and responded appropriately but minimally to anything the participant said in return.

In either condition, prior to play, participants answered a brief questionnaire with 5 items assessing their excitement toward the game, looking forward to playing it, expected fun and enjoyment, and interest in playing the game, using 7-point response scales. These items showed good internal consistency, $\alpha = .81$, and were averaged to form a summary measure of participants' motivation prior to play. The mean of the summary measure, at $M = 5.0$ ($SD = 0.82$) on a 7-point scale, indicated that most participants were positively motivated to play before their first turn.

The computerized gambling task used in this study was the Balloon Analog Risk Task (BART; Lejuez et al., 2002). The BART presents participants with a virtual balloon that can be inflated on-screen by a series of pumps (performed by clicking the mouse). Each balloon constitutes a trial, and 3 blocks of 10 trials comprise the task. Each pump of a balloon adds an imaginary \$0.05 to the potential

reward from that balloon, as tallied continuously on-screen for the participant to see. However, each pump also carries a risk that the balloon will explode. At any time, participants can transfer the amount they have accumulated to a permanent bank, and begin again with another balloon. If the balloon being inflated explodes first, however, all of its accumulated value is lost. Thus, the BART models many gambling situations in which the risk is also progressive with each decision to increase the potential reward. Although the funds shown on-screen were again imaginary, in this study, participants received a number of tickets for a prize draw (one of six \$50 gift certificates to a major shopping mall) in proportion to the final amount they had banked in the game.

Results and Discussion

Preliminary analyses focused on the effectiveness of the experimental delay manipulation to increase participants' motivation prior to play. Independent *t*-tests showed no significant differences between the delayed and the un-delayed participants in the feelings they expressed on the pre-game motivation scale, $M_{delayed} = 5.0$ ($SD = 0.82$) vs. $M_{un-delayed} = 4.9$ ($SD = 0.82$), $t(74) = -0.84$, $p = 0.41$. The sample mean rating of about 5 on a 7-point scale suggests that most participants were somewhat excited and looking forward to playing the game in any case, and only 9 participants gave ratings below the midpoint of the possible response range. However, participants in the delayed condition made more balloon-pumps in the first 10 trials of the game ($M = 24.5$, $SD = 7.91$), compared with those in the un-delayed condition ($M = 20.1$, $SD = 11.5$), to a degree approaching statistical significance, $t(74) = -1.97$, $p = .052$.

Preliminary analyses also examined typical changes in performance across trials of the BART task. Specifically, the number of pumps in each block of 10 trials served as the dependent measure in a mixed 2-factor ANOVA, in which Trial Blocks was the 3-level repeated factor, and Condition (Delay vs. No Delay) was the 2-level between-participants factor. The omnibus test of differences across the trial blocks was significant, $F(2, 148) = 21.13$, $p < .001$, $\eta^2 = .22$, as was the linear contrast test of growth from the first block to the last, $F(1, 74) = 34.25$, $p < .001$, $\eta^2 = .32$. The quadratic contrast test of the rate of change between each pair of blocks also closely approached significance, $F(1, 74) = 3.87$, $p = .053$, $\eta^2 = .05$. Thus, as shown in Figure 3, participants increased the number of pumps they made on average across the 3 trial blocks of the BART, and most of this increase occurred between the first and second blocks.

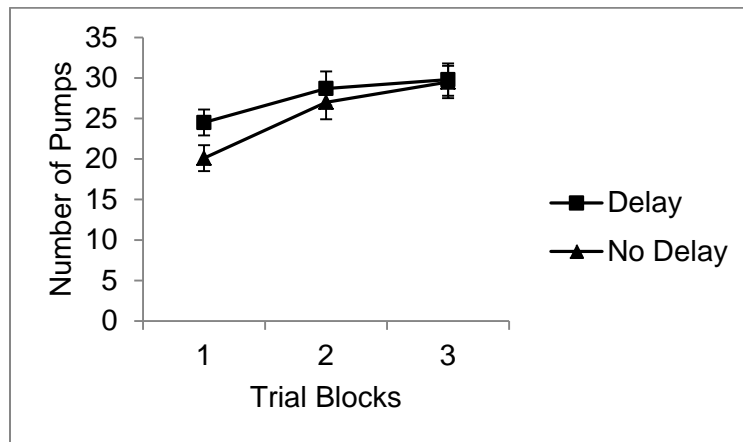


Figure 3. Mean number of balloon pumps in each trial block by participants in the delay ($n = 38$) vs. no-delay ($n = 38$) conditions of Study 4.

Unlike the IGT, performance in the first 10 trials of the BART is not assumed to be random. It appeared to be affected by the delay manipulation in this study (although this effect wore off quickly as shown in Figure 3), and it could be affected by other measured and unmeasured variables. Therefore, in analyzing BART data, we controlled for potential baseline differences by including the number of pumps participants made in the first 10 trials as a predictor of the number of pumps they made in the

last 10 trials. We further controlled for participants' PGSI scores. However, as this variable was highly skewed (as it typically is) and also could not be divided into standard categories with adequate numbers of participants at the low or high ends, a dichotomous transformation² was used to create lower (score ≤ 3) and higher (score > 3) PGSI groups with approximately equal representation ($n_s = 36$ and 40 , respectively). Participants' age and gender showed no significant correlations with any study variables and were not included in further analysis. The order of entry of predictors in our main analysis was specified in advance, with the number of pumps in the first 10 trials on step 1, and problem gambling severity and self-compassion on step 2. Results of the main analysis including the effect size or increment in explained variance at each step are shown in Table 7.

Table 7
Prediction of balloon pumps in the last 10 trials of the Balloon Analog Risk Task in Study 4.

Predictor	Step 1				Step 2			
	β	t/F	p	sr^2	β	t/F	p	sr^2
#Pumps ₁₋₁₀	.52	5.20	<.001	.28	.56	5.62	<.001	.30
PGSI Group					.21	2.04	.05	.04
Self-compassion					.19	1.86	.07	.03
R^2	.28	27.05	<.001		.34	11.62	<.001	
ΔR^2					.06	3.10	.05	

Note. Data are standardized regression coefficients, model and incremental R^2 values at each step, and corresponding significance tests with $N = 73$ and $df(1, 71)$ at step 1 and $df(3, 69)$ at step 2.

The results from step 1 indicate substantial stability, and therefore a probable role for individual differences, linking BART performance from the first trial block to the last. The results from step 2 further indicate a significant positive relationship between the participants' PGSI category and preference for risk, suggesting that even in a sample with restricted range on the PGSI, there are detectable differences in increased risk-taking between those with 2-3 signs of problem gambling and those with more than 3 signs. The results also show a non-significant trend (with $p < .07$), yet in the same direction as in the previous studies of undergraduates, for those with higher self-compassion to express larger increases from baseline risk-taking over subsequent trial blocks on the BART.

In sum, the delay manipulation used in this study did not unambiguously raise participants' motivation above their already high expectations to enjoy playing the gambling game. Delayed and un-delayed participants gave similar self-ratings of their motivation prior to play, but delayed participants then started the game with a burst of betting activity relative to un-delayed participants. Over the whole task and the whole sample, however, the present results provide a third illustration, using a different task, of the potential for self-compassion to facilitate taking risks among young adults with some signs of problem gambling.

Study 5

The final study in this series examined variations in the quality, rather than the level, of participants' motivation toward a gambling game. This study recruited 90 undergraduates with pre-measured self-compassion scores and PGSI scores of 3 or higher to a procedure in which they completed the BART. Prior to doing so, and in place of the delay procedure used in Study 4, they completed a writing task adapted from Pham and Avnet (2004) to instill either a prevention-focused or a promotion-focused mindset. As explained in regulatory focus theory (Crowe & Higgins, 1997; Higgins, 1998; Shah, Higgins, & Friedman, 1998), prevention focus describes a mindset wherein success equals avoidance of losses, whereas promotion focus describes a mindset wherein success equals attainment of gains. The writing task used here encouraged prevention focus by asking

² Less strenuous transformations such as the log and square root did not improve skewness of the resulting PGSI score distribution.

participants to write about their duties and obligations, and promotion focus by asking them to write about their hopes and dreams.

Either perspective can be taken too far: to the point where a prevention focus leads to overly cautious gambling decisions, or a promotion focus leads to overly risky ones. However, higher self-compassion should lead individuals not to worry or berate themselves about these errors. Therefore, it was hypothesized in this study that higher self-compassion should lead to an abundance of caution among participants given a prevention focus before the gambling task, and an abundance of risk-taking among those given a promotion focus instead.

The study is reported only in brief here, and the results are considered preliminary, because the sample attained for this study was smaller than desired.³ The study should be extended or repeated to confirm these preliminary results. Data were analyzed in a similar fashion as in the previous studies, by testing the self-compassion X framing-condition interaction effect in multiple regression. The results of this analysis revealed that the interaction effect accounted uniquely for 1.5% of variance in the outcome measure. Each of the simple slopes, though statistically non-significant, was in the predicted direction: Thus, consistent with the hypothesis, the relationship of self-compassion to accelerated risk-taking through the BART task was positive in the promotion-focused condition, and negative in the prevention-focused condition.

These preliminary findings suggest that prevention- and promotion-focused mindsets may warrant further investigation, as a motivational factor that can be primed in gambling situations and that may be able to modify self-compassion's effects on taking risks. However, any firm conclusions in this regard must await future research with a much larger sample, and/or a more direct manipulation of participants' motivational framing of the gambling task.

Mini Meta-Analysis

Across the 4 studies that did attain full samples, some variation in the results is apparent. In this situation, Goh et al. (2016) have recommended that researchers perform a mini meta-analysis on their own studies within a single manuscript. These authors note in particular that the cumulative evidence of an effect (found by averaging the effect size across studies) is more trustworthy than the impression created by examining a series of individual *p*-values for the same effect.

Using the procedures and formulas presented by Goh et al. (2016), the present meta-analysis used a fixed-effects approach to calculate and test the weighted mean correlation of self-compassion and gambling task performance among participants with low-level or more severe problem gambling, across the studies as shown in Table 9. The analysis focused on the simple slope parameter in the symptomatic group for several reasons: The overall interaction effect was consistently present in Studies 1-3, and, by focusing on the simple effect, we could both include Study 4 (which lacked a non-problem gambler condition) and address the contrasting results of Study 2.

In each study, the *t*-value for the simple effect was first converted to a Pearson's correlation measure of effect size. Most studies used the IGT outcome measure in which lower scores indicate higher risk-taking; therefore the effect size in Study 4 using the BART task was reverse-coded to match. The Pearson's correlations for each study were transformed again using Fisher's *z*-transformation prior to being combined in a weighted average by sample size. A *p*-value for this summary measure of effect size was obtained using Stouffer's *Z* test (two-tailed). Table 9 presents the results for the three studies that employed undergraduate participants and lab-based testing (in the upper panel), and for all of the studies without regard to differences in their samples, settings, and procedures (in the lower panel).

³ There were personnel reasons for the shortfall in participants, which were unrelated to the design and procedures of this experiment.

Table 8

Mini Meta-Analysis of the Relationship Between Self-Compassion and Gambling Task Performance Among Potential Problem Gamblers in Studies 1-4.

	<i>t</i>	<i>df</i>	<i>p</i>	<i>Z</i>	<i>r</i>	<i>r_z</i>
Study 1 (N = 168)	-2.68	163	.008	-2.59	-.20	-.20
Study 3 (N = 134)	-2.90	129	.004	-2.89	-.25	-.26
Study 4 (N = 73)	-1.86	69	.07	-1.79	-.21	-.21
<i>M_{rz}</i>						-.22
<i>M_r</i>						-.22
Combined <i>Z</i>						-4.20
<i>p</i>						.000027
Study 2 (N = 214)	3.15	209	.002	3.36	.23	.23
<i>M_{rz}</i>						-.06
<i>M_r</i>						-.06
Combined <i>Z</i>						-1.96
<i>p</i>						.05

The results in Table 8 show that the relationship between higher self-compassion and increased risk-taking on a gambling task was highly consistent across the 3 lab-based studies of undergraduates who showed any sign of problem gambling, with a mean correlation of $M_r = -.22$, $Z = -4.20$, $p < .0001$. The correlations with self-compassion were similar using either the IGT or the BART task to measure risk-taking. The result in the field-based Study 2 with casino patrons across a wide range of ages is a similar-sized correlation in the opposite direction. This contrasting result may be due to systematic differences between the settings and participant-populations involved. Indeed, the nature of these differences presents an interesting direction for future research. However, making no such assumption, the net result across all of the present studies ($N = 589$) is that potential problem gamblers higher in self-compassion showed increased risk-taking on a gambling task, with $M_r = -.06$, $Z = -1.96$, $p < .05$.

General Discussion

The aim of this research was to evaluate the prospective relationship of self-compassion to gambling decisions involving risk. Taking a contextual approach (Kashdan & Steger, 2011; McNulty & Fincham, 2012), each of the present studies examined and compared the effects of self-compassion between potential problem and non-problem gamblers, or between potential problem gamblers in different motivational states. Looking across the studies, which together involved screening of more than 6,000 individuals and direct testing of 725, this research further considered differences between student and non-student samples, laboratory and field settings, and risk-punishing and risk-rewarding gambling tasks.

Conclusions

Three main conclusions can be drawn from the present results. *First, self-compassion has little or no relationship to gambling decisions by those with no signs of problem gambling already, according to the PGSI.* Studies 1, 2, and 3 all permitted comparisons between potential problem and non-problem gamblers, and all found significant effects only among potential problem gamblers. Self-compassion and problem gambling may each develop independently, but self-compassion becomes relevant to gambling decisions in the presence of some potential for problem gambling.

Second, higher self-compassion is associated with taking more gambling risks among undergraduates with some risk for problem gambling. Undergraduates who met this condition in Studies 1, 3, and 4 took more risks in proportion to their level of self-compassion. They did so, perhaps unsurprisingly in Study 4, where there was potential to win an actual prize and where the average number of balloon pumps participants made was still well below the actuarial point of

maximum likelihood to win the prize. However, participants in Studies 1 and 3 faced probable negative gambling consequences for taking more risks, and those with higher self-compassion still took those additional risks. It is also very important to note that baseline differences were controlled in all of these studies. Therefore, these additional risks reflect increases over time and successive trials of the gambling tasks, which are linked with participants' self-compassion.

Third, higher self-compassion was associated with taking fewer gambling risks among casino patrons with low-level or more severe problem gambling, in Study 2. Although we hesitate to generalize this conclusion from a single study, the findings were statistically unlikely to have occurred by chance and may indicate theoretical moderators of the previous effects to be examined in future research. Undergraduates and casino patrons may differ in various ways. However, considering just those in each category who are at some risk of problem gambling already, the prospect of a developmental difference – i.e., having personally experienced negative consequences of gambling in one's lifetime – seems especially important to examine in future research. Indeed, in Study 2, self-compassion predicted taking fewer gambling risks most strongly among those casino patrons who met or exceeded the highest PGSI standard for problem gambling. This finding suggests that, if self-compassion does not always predict self-caring decisions in a risk-taking situation, it may do so when these decisions are further informed by having personally experienced negative consequences of problem gambling.

Limitations

Some limitations of the present studies have been noted already in the course of this report. An important limitation is that all of the major findings involving self-compassion derive from correlational analyses. Thus, the findings establish statistically reliable associations but not a cause-and-effect relationship between self-compassion and risk-taking in gambling decisions. Study 3 attempted to manipulate participants' state self-compassion in the interest of providing the evidence that would be needed to reach a cause-and-effect conclusion. The manipulation was not successful on the whole. However, it is possibly instructive for those who would seek to intervene in self-compassion among problem gamblers to note that the standard procedure we used was effective, but only among non-problem gamblers in the present Study 3.

The lack of experimental evidence notwithstanding, all of the present studies used prospective designs. Thus, self-compassion was measured consistently before the behaviour of interest (typically by several months), without the participants' knowledge of any anticipated connection to this behaviour, and using multi-trial tasks that allowed us to further observe change over trial blocks in the relevant behaviours. These design features make it unlikely that the act of completing the self-compassion measure might have led participants to gamble in a certain way, or that risky gambling decisions in the present studies might have evoked self-compassion after the fact. Gender also is not a plausible alternative explanation for the associations between self-compassion and decision-making found here.

Implications

The present findings are clearly preliminary and meant to address an initial, fundamental research question, yet they may have both theoretical and practical implications. On a theoretical level, the present findings cast significant doubt on the possibility that self-compassion exerts a broadly beneficial influence on gambling decisions, which in turn could protect highly self-compassionate individuals from developing a gambling addiction. Instead, it appears from the present findings that self-compassion has no association with these decisions except among individuals who already show some signs of problem gambling – and among some of them, it is related to riskier decision-making that will make the problem grow. Thus, it appears that the association of self-compassion with gambling decisions is not always benign and depends on contextual factors, such as the demographic and setting factors considered here.

On a practical level, although it was not a primary objective of this research, the present findings add to existing research on the validity of the Problem Gambling Severity Index (Ferris & Wynne, 2001). Previous validation studies have typically used survey methods to examine the PGSI's

factor structure, correlation with other problem gambling screens or gambling-related cognitions, retrospective association with recalled gambling frequency, ability to distinguish among problem gambler types, and prospective association with incidence rates of problem gambling (e.g., Orford et al., 2010; Miller et al., 2013; Sanscartier et al., 2018). However, few previous studies have examined the PGSI's relationship to directly observed gambling behaviour on a subsequent occasion. The present studies found repeated evidence that the 1+ criterion on the PGSI indicated significantly more risk-seeking behaviour on the IGT. In Study 4, which drew a sample of participants with 2+ scores on the PGSI, those with scores above 3 also showed more risk-seeking behaviour on the BART than did those with scores of 2-3. Thus, the PGSI appears to permit quite fine-grained prediction of individuals' behaviour, not only as it accumulates into a 12-month or lifetime incidence of problem gambling, but within a few minutes of gambling at an unfamiliar game on a single occasion.

Also on a practical level, the observation that self-compassion predicted risk-taking only among individuals with some signs of problem gambling could be useful in circumventing social desirability concerns during clinical interviewing and assessment of problem gambling. For example, a think-aloud protocol during a gambling scenario could be coded for the involvement of self-compassionate thoughts in betting decisions. Participants who are at risk, but might hesitate to express this under direct questioning, will have no similar motive to avoid expressing self-compassion while thinking aloud during gambling.

Finally, consistent with previous research by Baker and McNulty (2011) on self-compassion and by Wohl and colleagues (2017) on the dark side of self-forgiveness, the present findings urge caution about making increased self-compassion an intervention target for primary or secondary prevention of problem gambling among young people and particularly undergraduates. Individuals who are not continuing to gamble may benefit from developing their self-compassion without incurring further risk. However, undergraduates who show some indications of problem gambling appear to draw inferences from higher self-compassion that may put them at higher risk in the moment of making gambling decisions.

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