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ARTICLE



Risk and protective factors in problem gambling: an examination of psychological resilience

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ABSTRACT

Psychological resilience – successful adaptation when faced with adversity – is a product of the balance of risk and protective factors relevant to an outcome. This study examined if protective factors (perceived resilience; mindfulness; grit; self-efficacy) explained variance in problem gambling tendencies (assessed with the Problem Gambling Severity Index) beyond the HEXACO personality traits (honesty-humility, emotionality, extraversion, agreeableness, conscientiousness, openness to experience) and risk factors for problem gambling (gender; age; socio-economic status; high frequency gambling behaviour; harsh unpredictable childhood environments; sensation-seeking; impulsivity; self-control; stress). This study used a crowdsourced community sample ($n = 469$) recruited from Amazon Mechanical Turk. Bivariate analyses showed that risk factors and some HEXACO traits (especially honesty-humility) were associated with problem gambling issues. Among protective factors, only trait mindfulness showed a bivariate association with problem gambling issues. Somewhat surprisingly, regression analyses revealed that protective factors did not explain variance in problem gambling beyond HEXACO traits and risk factors. However, in exploratory analyses, mindfulness and self-efficacy – both modifiable protective factors – moderated the relationship between high-frequency gambling (a key proximate antecedent of problem gambling) and problem gambling tendencies. These results suggest mindfulness and self-efficacy may serve as ‘buffers’ against the development of problem gambling issues and may be promising targets for clinical interventions.

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Risk factors; protective factors; resilience; grit; mindfulness; self-efficacy; HEXACO

Growing attention has been dedicated to understanding protective factors that confer resilience to mental disorder, for good reason: understanding such factors allows for the development or refinement of interventions for improved mental health. However, relatively little research has examined the role of protective factors in the aetiology of gambling and problem gambling, especially alongside risk factors. Furthermore, although high-frequency gambling is strongly associated with problem gambling tendencies and clinically diagnosed pathological gambling (Griffiths, 1999; Mishra, Lalumière, & Williams, 2010; Welte, Barnes, Wieczorek, Tidwell, & Parker, 2004), not everyone who engages in high-frequency gambling necessarily exhibits problem

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gambling tendencies, or experiences a transition to pathological gambling. Yet, relatively little is known about protective factors (especially modifiable protective factors) that buffer against this transition.

The present study seeks to examine the relative associations of various risk and protective factors with problem gambling issues. We focus on protective factors that have been well-studied in other domains of health (i.e. mindfulness; self-efficacy; perceived resilience; Alsubaie et al., 2017; Chmitorz et al., 2018), but have been relatively understudied in the context of problem gambling. We also investigate the influence of the HEXACO personality traits – honesty-humility, emotionality, extraversion, agreeableness, conscientiousness, and openness to experience (Ashton & Lee, 2007) – on problem gambling. Relatively few studies have examined HEXACO in the context of gambling (but see McGrath, Neilson, Lee, Rash, & Mandana, 2018), despite research showing associations of HEXACO traits, especially honesty-humility, to more general forms of risk-taking (De Vries, de Vries, & Feij, 2009; Weller & Thulin, 2012; Weller & Tikir, 2011). In the following, we first review theory and evidence suggesting both risk and protective factors are important to understanding the aetiology of psychopathology, including problem gambling. We then present an empirical study examining (a) the associations of various risk and protective factors with problem gambling issues, and (b) whether protective factors can shed light on who experiences the shift from high-frequency gambling to problem gambling.

The psychology of resilience: risk and protective factors

People's capacity for resilience – successful adaptation in the face of trial, adversity, or burden – appears to be more widespread than previously thought (Rutter, 1985, 1987; LinkManagerBM_REF_mkosMxWo; reviewed in Chmitorz et al., 2018; Fletcher & Sarkar, 2013; Luthar, Cicchetti, & Becker, 2000). Early research in this area sought to identify individual differences in resilience, with the assumption that resilience is itself a unitary disposition (e.g. a 'hardy personality'; Block & Block, 1980; Chmitorz et al., 2018; Hu, Zhang, & Wang, 2015; Ong, Bergeman, Bisconti, & Wallace, 2006). However, evidence supporting the idea of stable individual differences in resilience has not been forthcoming, especially in the context of resilience to mental health problems (e.g. Bonanno & Diminich, 2013; Kalisch et al., 2017)

Recent approaches have more broadly characterized resilience as an outcome that in part is determined by dispositional individual differences (e.g. Chmitorz et al., 2018). These theoretical approaches suggest that resilience is the result of the combination of risk factors – variables associated with increased probability of developing a problem behaviour or condition – and protective factors – variables associated with reduced probability of developing a problem behaviour or condition, or variables that mitigate the risk associated with risk factors (Masten & Garmezy, 1985; Mrazek & Haggerty, 1994; Rutter, 1987). People who demonstrate resilience, especially in the development of mental disorders, are those whose protective factors exert greater influence than risk factors, especially in the face of stress, trauma, or adversity (Luthar et al., 2000; Masten, 2001). Regardless of the specific mechanisms, a contemporary understanding of resilience suggests that it describes one of two outcomes in response to adversity: the non-development of problems (e.g. mental disorders), or quick recovery from mental distress.

Risk factors

Several risk factors for problem gambling have been identified in numerous domains (reviewed in Toneatto & Nguyen, 2007). Among demographic variables, being male (Nower, Derevensky, & Gupta, 2004), being young (Shaffer, Hall, VanderBilt, 1999), and possessing low socio-economic status (Welte, Barnes, Weczorek, Tidwell, & Parker, 2001) are all risk factors for gambling-related problems. Dispositional (personality) factors related to greater problem gambling include impulsivity (Blaszczynski, Steel, & McConaghy, 1997), sensation-seeking (Mishra et al., 2010), low self-control (Mishra, Lalumière, & Williams, 2017), and high neuroticism (MacLaren, Best, Dixon, & Harrigan, 2011). Developmental and/or situational risk factors that have been associated with problem gambling include adverse childhood events (Lane et al., 2016) and psychosocial stress (Coman, Burrows, & Evans, 1997). We examine these risk factors in the empirical study presented below, in addition to a measure that has been yet unstudied in the context of gambling – childhood family unpredictability – which we review among other risk factors in the following.

Early childhood unpredictability

Life history theories of development suggest that unpredictability of early childhood environments contributes to elevated risk-acceptance (Ellis, Figueredo, Brumbach, & Schlomer, 2009). Empirical evidence is supportive of this link; measures of early childhood unpredictability have been associated with risky sexual behaviour, criminal conduct, and future discounting (Simpson, Griskevicius, Kuo, Sung, & Collins, 2012; Hill, Jenkins, & Farmer, 2008). Childhood unpredictability has also been associated with such health outcomes as alcoholism (Ross & Hill, 2004). However, no studies, to our knowledge, have examined the association of childhood unpredictability and problem gambling issues. This association bears investigation given that gambling represents a domain-specific form of risk-taking (Mishra et al., 2010).

HEXACO personality traits

Among personality measures, the canonical ‘Big Five’ traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism) have been amply studied as individual differences relevant to gambling (Brunborg, Hanss, Mentzoni, Molde, Pallesen, 2016; Hwang et al., 2012; MacLaren et al., 2011; Mishra, Lalumière, Morgan, & Williams, 2011; Mishra et al., 2017). However, the widely used HEXACO model of personality (Ashton & Lee, 2007) has had limited examination in the context of problem gambling (but see McGrath et al., 2018). The HEXACO model largely overlaps with the Big Five model in its assessment of extraversion, conscientiousness, agreeableness, and openness to experience. However, the HEXACO model decomposes neuroticism into *emotionality* (characterized by anxiety, fearfulness, empathy, sentimentality, need for emotional support) and a separate factor, *honesty-humility* (characterized by the avoidance of manipulating others, adherence to norms, and avoidance of the trappings of status). Importantly, low levels of honesty-humility have been associated with risk-prone behaviours, attitudes, and traits in multiple domains, including health/safety risk attitudes, risky driving, and status-driven risk-taking (Ashton, Lee, Pozzebon, Visser, & Worth, 2010; De Vries et al., 2009; Sween, Ceschi, Tommasi, Sartori, &

Weller, 2017; Weller & Thulin, 2012; Weller & Tikir, 2011). One recent study suggests meaningful associations between the HEXACO traits and problem gambling; McGrath et al. (2018) found that consistent with the risk literature, honesty-humility was a negative predictor of problem gambling tendencies, as were agreeableness and conscientiousness among a sample of undergraduate students.

Protective factors

Although several risk factors for problem gambling have been identified, comparatively less attention has been granted to understanding protective factors that may reduce risk or buffer against the development of problem gambling tendencies. Such factors as family cohesion, school connectedness, social bonding, and peer and familial modelling, among others, have been identified as potential sources of resilience among young gamblers (Dickson, Derevensky, & Gupta, 2008; Lussier, Derevensky, Gupta, & Vitaro, 2014; reviewed in Lussier, Derevensky, Gupta, Bergevin, & Ellenbogen, 2007; Shead, Derevensky, & Gupta, 2010). Subtypes of gamblers have also been identified by examining the balance of risk and protective factors (Allami, Vitaro, Brendgen, Carbonneau, & Tremblay, 2018). Oei and Goh (2015) showed that two protective factors (resilience and gambling refusal self-efficacy) uniquely predicted problem gambling in a model that also included three risk factors (gambling cognitions, gambling urges, and psychological distress) among a sample of Singaporeans. In the following, we review several key modifiable protective factors that have been suggested as important targets of intervention for mental health generally (and in some cases, gambling specifically): perceptions of resilience, mindfulness, grit, and self-efficacy.

Perceived trait resilience

Mental health generally and resilience specifically is in part a product of subjective perceptions of one's own ability to 'bounce back' after adversity. Resilience is also in part a product of perceptions of one's own ability to cope with stressors. The Brief Resilience Scale (Smith et al., 2008) measures perceptions around trait resilience (e.g. 'I usually come through difficult times with little trouble'; Smith et al., 2008), rather than resources that contribute to resilience (e.g. socio-economic status). Perceived trait resilience is a potentially modifiable protective factor that may serve to inoculate against mental disorder, and may be of importance in the aetiology of problem gambling. To our knowledge, no research has examined the association of perceived trait resilience with general gambling involvement or problem gambling issues.

Grit

Grit describes long-term goal-seeking in the face of adversity, and thus represents a protective factor that contributes to resilient outcomes (Duckworth, Peterson, Matthews, & Kelly, 2007). Individual differences in grit have been shown to predict achievement in several competitive domains beyond conscientiousness and IQ (Duckworth et al., 2007). Grit has also been suggested as a modifiable factor that can be targeted for intervention (Duckworth, Gendler, & Gross, 2016). Maddi et al. (2013) examined grit in the context of problem gambling, and found a small, non-significant association between the two variables.

Mindfulness

Mindfulness describes purposeful attention directed at present experiences (Brown & Ryan, 2003; Kabat-Zinn, 1990). Mindfulness has received substantial empirical and clinical attention in recent years, and evidence suggests its efficacy as a clinical intervention for multiple mental health issues (reviewed in Baer, 2003; Hofmann, Sawyer, Witt, & Oh, 2010; Keng, Smoski, & Robins, 2011). There is some evidence that mindfulness may be particularly useful for people who demonstrate elevated risk for psychopathology (Beshai & Parmar, *in press*; Ma & Teasdale, 2004). Dispositional mindfulness – individual differences in baseline tendency to attend to the moment – has been associated with problem gambling and general gambling involvement (de Lisle, Dowling, & Allen, 2014; Lakey, Campbell, Brown, & Goodie, 2007; Loo, Tsai, Raylu, & Oei, 2014; McKeith, Rock, & Clark, 2017). Mindfulness-based clinical interventions have also been shown to be promising for the treatment of pathological gambling (McIntosh, Crino, & O’Neill, 2016; Toneatto, Pillai, & Courtice, 2014; reviewed in Griffiths, Shonin, & Van Gordon, 2016). However, as de Lisle, Dowling, and Allen (2012) noted, the literature is limited, and present studies have methodological limitations (Hedman-Lagerlöf, Hedman-Lagerlöf, & Öst, 2018). Regardless, mindfulness appears to be a potentially important modifiable protective factor in the aetiology of problem gambling requiring further examination.

Self-efficacy

Self-efficacy describes the perception that one is capable of organizing and executing actions in order to achieved desired outcomes (Bandura, 1977). Self-efficacy was recognized early as a key protective factor that helps to confer resilience in the face of risk or adversity (Rutter, 1985), and empirical evidence suggests that higher self-efficacy is associated with enhanced ability to abstain from harmful behaviours (e.g. substance use; Condiotte & Lichtenstein, 1981; Rounds-Bryant, Flynn, & Craighead, 1997). Some evidence also suggests self-efficacy serves as a protective factor against problem gambling tendencies (Oei & Goh, 2015; Oei & Raylu, 2015), especially when measured in a gambling-specific manner (Hodgins, Peden, & Makarchuk, 2004; May, Whelan, Steenbergh, & Meyers, 2003). Because self-efficacy is modifiable, it represents a promising candidate for resilience promotion.

Overview

The present investigation had three primary goals. First, we sought to examine associations between the HEXACO personality traits and problem gambling issues in a community sample of adults. This examination is particularly informative given that low levels of honesty-humility (a trait that does not exist in the canonical Big Five personality model) has been recently associated with problem gambling tendencies among undergraduate students, and has in past research been associated with various forms of risk-taking in multiple non-gambling domains. Second, we examined associations between problem gambling issues and several risk and protective factors. We specifically investigated modifiable protective factors (i.e. perceived resilience, grit, mindfulness, and self-efficacy) owing to their potential use for clinical interventions. We also examined risk factors that have been previously

associated with problem gambling tendencies (gender; age; socio-economic status; high frequency gambling behaviour; harsh unpredictable childhood environments; sensation-seeking; impulsivity; self-control; stress). We hypothesized that both risk and protective factors would be robustly associated with problem gambling, and that protective factors would explain unique variance in problem gambling issues beyond demographics, HEXACO personality traits, and key risk factors. Finally, we explored support for the hypothesis that modifiable protective factors may ‘buffer’ the transition from high-frequency gambling to problem gambling (potentially conferring resilient outcomes).

Method

Participants

Four hundred and sixty-nine participants were recruited from the Anglosphere – English-speaking, Western countries (i.e. Australia, Canada, Ireland, New Zealand, the United Kingdom, and the United States) – using Crowdfunder, an online crowdsourcing platform that has been widely used and validated for mental health research (reviewed in Chandler & Shapiro, 2016), including gambling research (Mishra & Carleton, 2017).

Measures

Participants completed measures of demographics, general gambling involvement, problem gambling issues, HEXACO personality traits, risk factors, and protective factors as described below. Participants were compensated with \$0.75 USD (or equivalent). Ethics approval for this study was granted by the University of Regina Research Ethics Board. All participants provided informed consent and were debriefed following their participation.

Problem gambling

Problem gambling issues were measured using the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). Participants self-reported their gambling behaviours and feelings related to gambling (e.g. ‘Have you bet more than you could really afford to lose?’) within the last 12 months, on a scale ranging from 0 (*never*) to 3 (*almost always*), with higher scores indicating greater problem gambling tendencies. The PGSI has been shown to consistently demonstrate high reliability and internal and external validity, and is considered one of the best measures of problem gambling tendencies (Currie et al., 2012; Orford, Wardle, Griffiths, Sproston, & Erens, 2010; Stinchfield et al., 2016). Scores categorize participants as follows: non-problem or non-gamblers (0), at-risk gamblers (1–4), and problem and pathological gamblers (5–27) (Williams & Volberg, 2014).

HEXACO personality traits

The HEXACO personality traits were assessed using the 24-item Brief HEXACO Inventory (BHI; De Vries, 2013). Participants self-reported degree of agreement with

statements related to six underlying traits: honesty-humility (e.g. 'I find it difficult to lie'); emotionality (e.g. 'I worry less than others'); extraversion (e.g. 'I easily approach strangers'); agreeableness (e.g. 'I often express criticism'); conscientiousness (e.g. 'I work very precisely'); and openness to experience (e.g. 'I like people with strange ideas'). The HEXACO inventory has been increasingly widely used, especially as an (arguably) more ecologically valid, evolutionarily, informed alternative to the Big Five personality traits (Ashton & Lee, 2007). Although short personality inventories have limitations that confer low internal reliability, they are still useful in situations of constrained time given their convergence with full inventory measures, their adequate test-retest reliability, and their pattern of convergent validity with relevant other measures (De Vries, 2013; Gosling, Rentfrow, & Swann, 2003). The BHI in particular shows strong psychometric properties for a brief personality inventory, including adequate factor structure, adequate test-retest reliability (ranging from .71 to .79, depending on facet), and adequate convergent validity with the full HEXACO-PI-R (ranging from .59 to .83, depending on facet and subsample) (De Vries, 2013).

Risk factors

Gambling Behaviours Scale (GBS)

High-frequency gambling is an important proximate risk factor for problem gambling. Frequency of engagement with various types of gambling behaviours was assessed using the frequency subscale of the Gambling Behaviours Scale (GBS; Mishra et al., 2010). Participants self-reported the frequency of engagement in different types of gambling behaviours (e.g. 'lottery tickets'; 'bingo') over the previous 12 months, on a scale ranging from 1 (*daily*) to 7 (*never*). Scores were reversed so that higher total scores indicated more frequent gambling behaviours. This scale has been used in previous work to assess general gambling involvement (e.g. Mishra & Carleton, 2017; Mishra et al., 2011).

Adverse Childhood Experiences (ACE)

Experiences of physical, psychological and sexual abuse perpetrated by family members were measured by the Adverse Childhood Experiences scale (ACE; Felitti et al., 1998). Participants self-reported their experiences (yes/no) with 25 adverse childhood events (e.g. 'Did a parent or other adult in the household often or very often swear at, insult, or put you down?'). Higher scores indicated a higher frequency of adverse childhood experiences.

Retrospective Family Unpredictability Scale (RFUS)

Inconsistency in family behaviours during childhood was measured using the Retrospective Family Unpredictability Scale (RFUS; Ross & McDuff, 2008). The RFUS contains subscales of unpredictability in meals, money, nurturance (separated based on parent) and discipline (separated based on parent). Participants self-reported their agreement with 28 statements (e.g. 'Some months we had plenty of money to spend, other months we were quite poor') on a scale ranging from 1 (*not at all*) to 5 (*extremely*). Higher scores indicated greater childhood family unpredictability.

Brief Sensation Seeking Scale (BSSS-8)

The Brief Sensation Seeking Scale (BSSS-8) measures the need for varied, stimulating experiences and disinhibited behaviour across eight items (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002). Participants self-reported their preferences for eight stimulating experiences (e.g. 'I would like to do frightening things') on a scale ranging from 1 (*strongly disagree*) to 5 (*agree strongly*), with higher scores indicating greater sensation-seeking.

Barratt Impulsiveness Scale (BIS-15)

Impulsivity was measured with the Barratt Impulsiveness Scale (BIS-15), assessing attentional impulsivity, motor impulsivity, and non-planning (Spinella, 2007). Participants self-reported their agreement with 15 behavioural statements (e.g., 'I get easily bored when solving thought problems') on a scale ranging from 1 (*rarely/never*) to 4 (*always*). Higher scores indicated greater impulsivity.

Brief Self-Control Scale (BSCS)

Self-control was measured using the Brief Self-Control Scale (BSCS; Tangney, Baumeister, & Boone, 2004). Participants self-reported their agreement with 13 dispositional statements (e.g. 'I say inappropriate things') on a scale ranging from 1 (*not at all like me*) to 5 (*very much like me*). Higher total scores indicated poorer self-control.

Perceived Stress Scale (PSS-10)

Perceptions of stress were measured with the Perceived Stress Scale (PSS-10; Cohen, Kamarck, & Mermelstein, 1983). Participants self-reported the magnitude of their stress, coping abilities and self-confidence across 10 items (e.g. 'In the last month, how often have you felt that you were unable to control the important things in your life?') over a 1-month period of time, on a scale ranging from 0 (*never*) to 4 (*very often*). Higher total scores indicated greater perceived stress.

Protective factors

Short Grit Scale (Grit-S)

Consistency of interest and perseverance of effort were measured using the Short Grit Scale (Grit-S; Duckworth & Quinn, 2009). Participants self-reported their agreement with eight dispositional statements (e.g. 'New ideas and projects sometimes distract me from previous ones') on a scale ranging from 1 (*very much like me*) to 5 (*not like me at all*). Higher scores indicated greater grit.

Five-Facet Mindfulness Questionnaire – Short Form (FFMQ-SF)

Mindfulness was assessed using the Five Facet Mindfulness Questionnaire – Short Form (FFMQ-SF; Bohlmeijer, Ten Klooster, Fledderus, Veehof, & Baer, 2011). Participants self-reported their agreement with 24 statements about daily experiences (e.g. 'I'm good at finding the words to describe my feelings') on a scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*). Higher total score indicated greater mindfulness.

Brief Resilience Scale (BRS)

Subjective perceptions about ability to cope with hardship was assessed by the Brief Resilience Scale (BRS; Smith et al., 2008). Participants self-reported their agreement with six dispositional statements (e.g. ‘I tend to bounce back quickly after hard times’) on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores indicated greater subjective perceptions of resilience.

New General Self-Efficacy scale (NGSE)

General self-efficacy was assessed by the New General Self-Efficacy scale (NGSE; Chen, Gully, & Eden, 2001). Participants self-reported their agreement with eight statements about their perceived performance and ability to achieve goals (e.g. ‘When facing difficult tasks, I am certain that I will accomplish them’) on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicated greater self-efficacy.

Data preparation

Among demographic variables, missing values were observed for age ($n = 4$), gender ($n = 4$) and country of origin ($n = 3$). Participants were excluded from the final sample for failing an attention check ($n = 127$; Goodman, Cryder & Cheema, 2013), being under the age of 18 ($n = 1$) or residing outside the Anglosphere ($n = 3$). A final sample of 327 participants (187 females, 135 males, 1 trans*; age: $M = 35.6$, $SD = 12.6$, range: 18–78) was included in the study. The proportion of missing values within each scale for each participant was calculated. If this proportion exceeded 20%, a total score was not computed and was treated as a missing value; if the missing proportion was less than 20%, mean imputation was used (Downey & King, 1998; Shrive, Stuart, Quan, & Ghali, 2006). Simulation studies have shown that error estimates significantly increase after more than 20% of values are missing within-scale (e.g. Dong & Peng, 2013). Fewer than 5% of total scores were missing, at random, so we utilized listwise deletion.

Results

Descriptive statistics for demographics are provided in Table 1, and for all other measures in Table 2. The following clinically informed PGSI cut-off scores recommended by Williams and Volberg (2014) were used to categorize participants: non-problem or non-gamblers (0), at-risk gamblers (1–4) and problem and pathological gamblers (5–27). Participants were categorized as follows: non-problem or non-gamblers (69.1%); at-risk gamblers (10.4%); problem and pathological gamblers (14.4%); missing (6.0%).

Problem gambling and HEXACO personality, risk factors and protective factors

Pearson correlations (r) between problem gambling issues, the HEXACO personality traits, and the various risk and protective factors assessed in this study are presented in Table 3. PGSI scores were significantly and negatively associated with honesty-humility, extraversion, conscientiousness, and openness to experience. PGSI scores were significantly and positively associated with all risk factors save for perceived stress. Among

Table 1. Demographic frequency statistics.

<i>Employment status</i>	
Employed full-time	48.62%
Employed part-time	22.32%
Previously employed	18.96%
Never employed	3.67%
Retired	5.20%
(Not reported)	1.22%
<i>Educational attainment</i>	
Did not finish high school	0.61%
High school or GED	16.51%
Some college/university	22.63%
College/university	40.37%
Graduate/postgraduate/professional degree	18.87%
(Not reported)	0.92%
<i>Relationship status</i>	
Single	33.64%
Dating/long-term relationship	11.31%
Married or equivalent	48.01%
Separated/divorced	3.98%
Widowed	2.14%
(Not reported)	0.92%
<i>Annual personal income</i>	
< \$10,000	27.52%
\$10,001–20,000	12.84%
\$20,001–30,000	16.82%
\$30,001–40,000	10.40%
\$40,001–50,000	11.32%
\$50,001–75,000	12.54%
\$75,001–100,000	3.67%
> \$100,000	3.06%
(Not reported)	1.83%
<i>Annual household income</i>	
< \$10,000	4.28%
\$10,001–20,000	6.42%
\$20,001–30,000	15.29%
\$30,001–40,000	10.09%
\$40,001–50,000	11.93%
\$50,001–75,000	22.63%
\$75,001–100,000	13.46%
> \$100,000	14.68%
(Not reported)	1.22%

protective factors, PGSI scores were significantly and negatively associated with total mindfulness scores.

Do protective factors explain unique variance in problem gambling issues?

To examine whether resilience factors were significantly predictive of problem gambling after controlling for demographics, HEXACO personality traits, and risk factors, we conducted a hierarchical regression with PGSI scores as the dependent variable, demographics entered in step one, HEXACO traits entered in step two, risk factors in step three, and protective factors in step four of the analysis. Contrary to our hypotheses, this analysis revealed that resilience did not predict a significant portion of variance in PGSI scores (Table 4) after controlling for variance of demographics, personality traits and risk factors.

Table 2. Descriptive statistics and reliabilities for problem gambling, and risk and protective factors.

Measure	α	M (SD)
<i>Problem gambling</i>		
PGSI	.96	10.69 (4.13)
<i>HEXACO personality</i>		
BHI-H	.48	14.78 (2.85)
BHI-E	.40	12.14 (2.58)
BHI-X	.68	13.38 (3.20)
BHI-A	.48	11.38 (2.49)
BHI-C	.50	13.71 (2.54)
BHI-O	.44	14.12 (2.48)
<i>Risk factors</i>		
GBS (Frequency)	.82	13.26 (14.62)
ACE	.89	2.18 (3.41)
RFUS	.91	72.69 (18.94)
BSSS	.81	21.84 (5.94)
BIS	.79	31.73 (6.08)
BSCS	.89	33.44 (9.58)
PSS	.89	27.86 (7.69)
<i>Protective factors</i>		
Grit-S	.82	26.89 (5.42)
FFMQ	.86	78.45 (11.98)
BRS	.88	18.82 (4.95)
NGSE	.95	40.30 (9.16)

$\alpha \geq .9$ = excellent; $.9 > \alpha \geq .8$ = good; $.8 > \alpha \geq .7$ = acceptable; $.7 > \alpha \geq .6$ = questionable; $\alpha < .6$ = poor. PGSI = Problem Gambling Severity Index. GBS = Gambling Behavior Scale. ACE = Adverse Childhood Experiences. RFUS = Retrospective Family Unpredictability Scale (total score). BHI = Brief HEXACO Inventory; H = honesty-humility; E = emotionality; X = extraversion; A = agreeableness; C = conscientiousness; O = openness to experience. BSSS = Brief Sensation Seeking Scale. BIS = Barratt Impulsiveness Scale. BSCS = Brief Self-Control Scale. PSS = Perceived Stress Scale. Grit-S = Short Grit Scale. FFMQ = Five-Facet Mindfulness Questionnaire – short form (total score). BRS = Brief Resilience Scale. NGSE = New General Self-Efficacy scale.

Do protective factors buffer against problem gambling issues?

High-frequency gambling is a necessary precondition to the development of problem gambling issues. We conducted a series of exploratory hierarchical regressions to examine whether four modifiable protective factors (grit, mindfulness, perceived resilience, and self-efficacy) serve as a ‘buffer’, diminishing the association between high-frequency gambling and problem gambling issues. Results indicated that mindfulness and self-efficacy both served as significant moderators of the association between high-frequency gambling (GBS) and problem gambling issues (PGSI). Neither grit nor perceived resilience were found to be significant moderators of this association. These results are summarized in [Tables 5](#) and [6](#).

To aid in the visual interpretation of the moderation effect of mindfulness and self-efficacy, we created three groups based on tertile scores for gambling frequency, mindfulness, and self-efficacy: ‘Low’ ($n = 109$), ‘Moderate’ ($n = 109$) and ‘High’ ($n = 109$) ([Figure 1, 2](#)). People who were in the top tertile of gambling frequency who also

Table 3. Pearson correlation coefficients (*r*) of problem gambling (PGSI total scores), HEXACO personality, and risk and protective factors.

	PGSI
<i>HEXACO personality</i>	
BHI-H	-.35**
BHI-E	-.001
BHI-X	-.13*
BHI-A	.003
BHI-C	-.20**
BHI-O	-.13*
<i>Risk factors</i>	
ACE	.15**
RFUS	.22**
GBS – Frequency	.39**
BSSS	.23**
BIS	.20**
BSCS	.19**
PSS	.10
<i>Protective factors</i>	
Grit-S	-.07
FFMQ	-.13*
BRS	.00
NGSE	-.09

* $p < .05$. ** $p < .01$. PGSI = Problem Gambling Severity Index. GBS = Gambling Behavior Scale. ACE = Adverse Childhood Experiences. RFUS = Retrospective Family Unpredictability Scale. BHI = Brief HEXACO Inventory. BSSS = Brief Sensation Seeking Scale. BIS = Barratt Impulsiveness Scale. BSCS = Brief Self-Control Scale. PSS = Perceived Stress Scale. Grit-S = Short Grit Scale. FFMQ = Five-Facet Mindfulness Questionnaire – short form. BRS = Brief Resilience Scale. NGSE = New General Self-Efficacy scale.

possessed high levels of mindfulness (Figure 1) or self-efficacy (Figure 2) showed significantly lower problem gambling issues.

Discussion

The results of this study support previous research suggesting that risk factors are highly implicated in problem gambling issues, including early childhood unpredictability, a yet unstudied risk factor for gambling. Among HEXACO personality traits, we observed significant bivariate associations between problem gambling issues and honesty-humility, extraversion, conscientiousness, and openness to experience. Among protective factors, we observed only a single bivariate association between problem gambling issues and mindfulness. Protective factors did not collectively explain unique variance in problem gambling issues beyond known risk factors. Finally, we found in exploratory analyses that high levels of self-efficacy and mindfulness serve to reduce the association between high-frequency gambling and problem gambling issues. Taken together, although risk factors appear to have greater predictive power than protective factors in the aetiology of (adult) problem gambling, mindfulness and self-efficacy represent potentially promising modifiable protective factors that may serve to buffer against the development of problem gambling issues.

Table 4. Predictive power of protective factors on PGSI scores, beyond demographics, personality, and risk factors.

	B	SE	β	t
Step 1 (Demographics): $R = .38, R^2 = .14^{**}$				
Age	-.06	.02	-.19	-2.73**
Gender	-1.49	.50	-.18	-3.00**
Relationship status	.24	.24	.063	1.02
Education	.54	.20	.15	2.74**
Personal income	-.16	.13	-.08	-1.22
Household income	-.24	.12	-.12	-1.90
Step 2 (Personality): $R = .46, R^2 = .21, \Delta R^2 = .066^{**}$				
BHI-H	-.19	.09	-.14	-2.11*
BHI-E	.04	.11	.03	.40
BHI-X	-.08	.09	-.06	-.86
BHI-A	.06	.10	.04	.67
BHI-C	-.20	.13	-.13	-1.58
BHI-O	-.20	.10	-.12	-2.11**
Step 3 (Risk factors): $R = .58, R^2 = .34, \Delta R^2 = .13^{**}$				
GBS (Frequency)	.10	.02	.31	5.48**
ACE	.15	.08	.13	1.97*
RFUS	.12	.07	.12	1.78
BSSS	.02	.05	.03	.42
BIS	.05	.05	.09	.98
BSCS	-.01	.04	-.02	-.20
PSS	-.03	.04	-.05	-.74
Step 3 (Protective factors): $R = .59, R^2 = .35, \Delta R^2 = .014$				
Grit-S	.13	.06	.17	1.99*
FFMQ	.02	.03	.06	.50
BRS	-.02	.06	-.03	.75
NGSE	.01	.03	.03	.68

* $p < .05$. ** $p < .01$. PGSI = Problem Gambling Severity Index. GBS = Gambling Behavior Scale. ACE = Adverse Childhood Experiences. RFUS = Retrospective Family Unpredictability Scale. BHI = Brief HEXACO Inventory. BSSS = Brief Sensation Seeking Scale. BIS = Barratt Impulsiveness Scale. BSCS = Brief Self-Control Scale. PSS = Perceived Stress Scale. Grit-S = Short Grit Scale. FFMQ = Five-Facet Mindfulness Questionnaire – short form. BRS = Brief Resilience Scale. NGSE = New General Self-Efficacy scale.

Table 5. Moderating effect of GRIT (Right) and mindfulness (FFMQ, Left) in the relationship of gambling frequency and PGSI total scores.

Grit (Grit-S)	β	t	Mindfulness (FFMQ)	β	t
Main Effects: $R = .39, R^2 = .16^{**}$			Main Effects: $R = .41, R^2 = .17^{**}$		
Gambling Frequency (Centred)	.39	7.58**	Gambling Frequency (Centred)	.39	7.59**
Grit-S (Centred)	-.06	-1.13	FFMQ Total (Centred)	-.12	-2.43*
Interaction: $R = .40, R^2 = .16, \Delta R^2 = .01$			Interaction: $R = .46, R^2 = .21, \Delta R^2 = .04^{**}$		
Gambling Frequency (Centred)	.39	7.57**	Gambling Frequency (Centred)	.38	7.70**
Grit-S (Centred)	-.08	-1.54	FFMQ Total (Centred)	-.20	-3.83**
Gambling Frequency x Grit-S	-.09	1.71	Gambling Frequency x FFMQ	-.23	-4.26**

* $p < .05$; ** $p < .01$. FFMQ = Five-Factor Mindfulness Questionnaire. PGSI = Problem Gambling Severity Index.

Previous research examining the canonical Big Five traits suggests that high neuroticism, low conscientiousness and low agreeableness are associated with severity of gambling problems (reviewed in Brunborg et al., 2016). In one recent study, McGrath et al. (2018) found associations between honesty-humility, agreeableness, and conscientiousness as measured by the HEXACO in a sample of undergraduate students. We observed that in the HEXACO personality space, low honesty-humility, low extraversion, low conscientiousness, and low openness to experience explained variance in gambling issues. The HEXACO traits differ from the Big Five primarily in the absence of neuroticism; components of neuroticism are instead distributed among honesty-

Table 6. Moderating effect of resilience (BRS; Left) and self-efficacy (NGSE; Right) in the relationship of gambling frequency and PGSI total scores.

Perceived Resilience (BRS)	β	t	Self-Efficacy (NGSE)	β	t
Main Effects: $R = .39, R^2 = .15^{**}$			Main Effects: $R = .40, R^2 = .16^{**}$		
Gambling Frequency (Centred)	.40	7.64**	Gambling Frequency (Centred)	.39	7.72**
BRS Total (Centred)	-.05	-0.95	NGSE Total (Centred)	-.10	-1.96*
Interaction: $R = .39, R^2 = .16, \Delta R^2 = .00$			Interaction: $R = .43, R^2 = .19, \Delta R^2 = .03^{**}$		
Gambling Frequency (Centred)	.40	7.69**	Gambling Frequency (Centred)	.39	7.71**
BRS Total (Centred)	-.07	-1.21	NGSE Total (Centred)	-.14	-2.77**
Gambling Frequency x BRS	-.05	-0.90	Gambling Frequency x NGSE	-.17	-3.19**

* $p < .05$; ** $p < .01$. NGSE = New General Self-Efficacy Scale. PGSI = Problem Gambling Severity Index. BRS = Brief Resilience Scale.

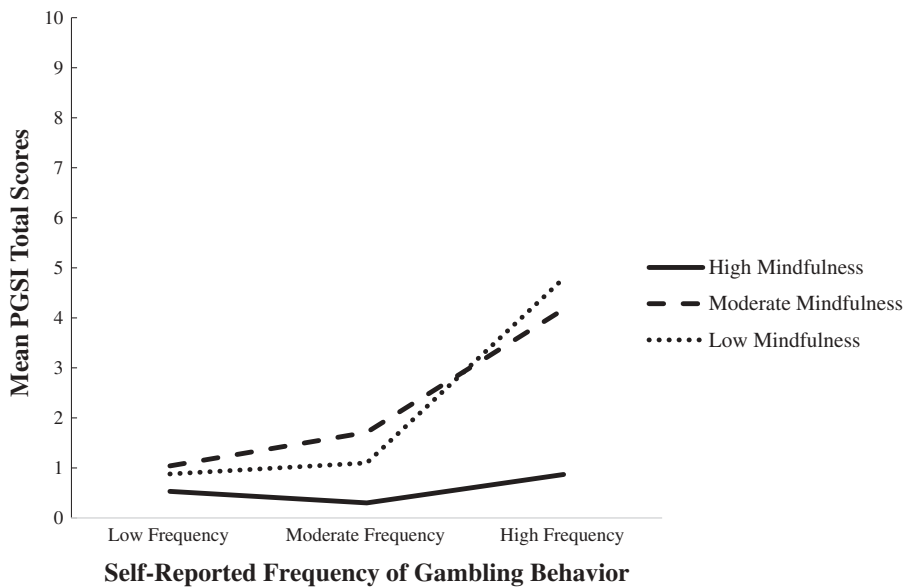


Figure 1. Mindfulness moderates the association between frequency of gambling behaviour and self-reported problem gambling issues as measured by the Problem Gambling Severity Index (PGSI).

humility, agreeableness, and emotionality (especially components related to having a quick temper). As a result, some divergent results (e.g. a lack of association with emotionality in the HEXACO space in the present study) may reflect the influence of different subcomponents of personality. We administered a short version of the HEXACO, and so were unable to examine the associations of specific subfacets of HEXACO personality traits with problem gambling issues in the present study. It would be highly informative to administer a full HEXACO inventory (with its six core traits, and four facet-level subscales for each trait) in future studies of problem gambling to better understand the personality mechanisms that might contribute to problem gambling issues.

A number of our findings involving risk factors are consistent with previous research. Gambling frequency was robustly associated with problem gambling issues. We also found significant associations between dispositional risk factors (impulsivity, sensation-seeking, low self-control, conscientiousness) and problem gambling issues,

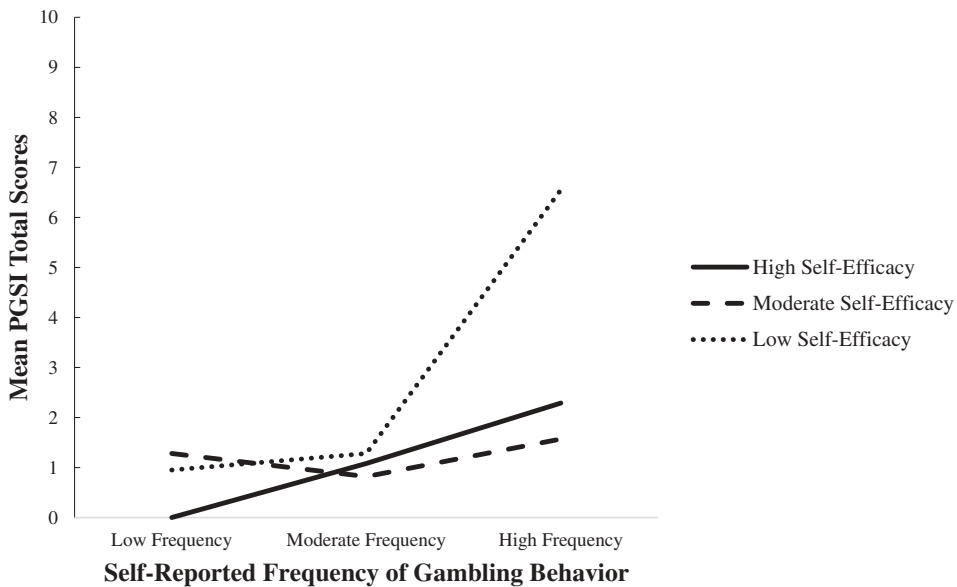


Figure 2. Self-efficacy moderates the association between frequency of gambling behaviour and self-reported problem gambling issues as measured by the Problem Gambling Severity Index (PGSI).

consistent with a large body of previous research (reviewed in Mishra et al., 2017; Toneatto & Nguyen, 2007). Poorer developmental environments were also associated with higher levels of gambling issues (Lane et al., 2016). Of note, this is the first empirical demonstration of the association of childhood unpredictability with problem gambling. The results provide evidence that the condition of early childhood environments in the forms of both harshness (as measured by the ACE) and unpredictability (measured by the RFUS) explain variance in problem gambling issues. Early childhood unpredictability is implicated as a key factor in the development of ‘fast’ life history strategies, which are characterized by impulsive and present-oriented decision-making (reviewed in Del Giudice, Gangestad, & Kaplan, 2015). Previous work has linked fast life history strategies to gambling (e.g. Mishra, Templeton, & Meadows, 2017; Tifferet, Agrest, & Shlomo, 2011); knowledge of the developmental pathways that lead to such outcomes would be illuminating.

Protective factors explained less variance in problem gambling issues than expected. Hierarchical regression analyses demonstrated that protective factors did not account for variance beyond demographics, personality and risk factors. There was also only one significant bivariate correlation involving mindfulness, which is consistent with some previous research (Lakey et al., 2007; Riley, 2014). Interestingly, we found evidence that dispositional mindfulness ‘protects’ against frequent gambling behaviour in predicting problem gambling. Compared to people reporting high dispositional mindfulness, those who reported frequent gambling and low dispositional mindfulness were significantly more likely to also report problem gambling behaviour. This finding is consistent with studies in the area of depression, which demonstrate that mindfulness approaches may provide the greatest benefit for those who need them the most (i.e. showing greatest

risk; Beshai & Parmar, *in press*; Bockting, Hollon, Jarrett, Kuyken, & Dobson, 2015; Ma & Teasdale, 2004; Williams & Volberg, 2010).

The null association between grit and problem gambling issues also replicates results from one previous study (Maddi et al., 2013). Grit – passion and perseverance in the achievement of long-term goals – has been lionized as a powerful and potentially self-driven pathway to success. However, psychometrically, grit has not weathered scrutiny well. Strong recent evidence suggests grit is essentially another form of conscientiousness. For example, Rimfeld, Kovas, Dale, and Plomin (2016) showed in a large sample of teenagers that grit did not explain additional phenotypic or genotypic variance beyond conscientiousness in the prediction of school grades. In a meta-analysis of 88 independent samples comprised of 66,807 individuals, Crede, Tynan, and Harms (2017) showed that there is no coherent higher structure for the concept of grit, grit is only moderately associated with achievement outcomes, and grit does not explain variance in outcomes beyond conscientiousness. Taken together, this evidence suggests grit may not be a promising target for interventions.

It was somewhat surprising to observe a null association between self-efficacy and problem gambling issues. Previous work has shown that gambling domain-relevant self-efficacy (e.g. gambling control self-efficacy, gambling self-refusal; Casey, Oei, Melville, Bourke, & Newcombe, 2008; Kaur, Schutte, & Thorsteinsson, 2006) appears to be protective against problem gambling issues. However, general self-efficacy has not been previously associated with problem gambling, although it has been associated with other forms of mental distress. One possibility is that general self-efficacy (i.e. general confidence in one's abilities) is not particularly relevant to a behavioural outcome that is in large part determined by luck (Gist & Mitchell, 1992).

Although bivariate correlations and regression analyses suggested that protective factors were less important than expected, exploratory moderation analyses suggest that some protective factors may interact with gambling frequency to influence problem gambling issues. We found that both mindfulness and self-efficacy significantly moderated the association between self-reported frequency of gambling behaviour and problem gambling issues. High-frequency gambling is strongly associated with problem gambling tendencies and clinically diagnosed pathological gambling (Griffiths, 1999; Mishra et al., 2010; Welte et al., 2004). However, not everyone who gambles at a high frequency necessarily develops mental distress as a consequence. The immunization hypothesis of resilience suggests that certain traits or abilities can serve as a 'buffer' against the development of pathology, even in the presence of risk factors (reviewed in Davydov, Stewart, Ritchie, & Chaudieu, 2010). In this case, it appears that mindfulness and general self-efficacy appear to 'buffer' against high-frequency gambling shifting into problem gambling issues. However, it must be noted that our data is cross-sectional and this analysis is exploratory, and so replication and extension is necessary before any strong claims can be made. However, mindfulness and self-efficacy are promising 'immunization' candidates because both are modifiable through intervention (Alsubaie et al., 2017), and indeed both have been targets of successful mental health interventions (Ashford, Edmunds, & French, 2010; Khoury et al., 2013).

This study examined risk factors and protective factors for gambling issues in concert. Our findings are somewhat consistent with previous research. Lussier et al. (2014) showed that collectively, resource protective factors (social bonding, personal

competence and social competence) did not moderate problem gambling tendencies, although social bonding was a meaningful individual predictor. Oei and Goh (2015) showed among a sample of Singaporeans that two protective factors (perceived resilience and gambling refusal self-efficacy) explained variance in problem gambling beyond risk factors (gambling cognitions, gambling urges and psychological distress), and that risk factors interacted with protective factors to further predict problem gambling. Our studies somewhat replicate and extend these previous findings. We did not find that protective factors explained variance beyond personality and (a larger set of) risk factors. However, certain protective factors (namely, mindfulness and self-efficacy) moderated the association between gambling frequency (a fundamental risk factor for problem gambling) and problem gambling itself. Our study also used a large Western adult community sample, and so is complementary to the research Lussier et al. (2014) conducted among young people, and research Oei and Goh (2015) conducted among an East Asian population. We suggest that future problem gambling research would benefit from the assessment and integration of both risk and protective factors within studies.

Our results have limitations that provide directions for future research. Our study was cross-sectional, meaning that the results provide no information about the directionality of the associations we observed (save for retrospective measures about childhood environments). Future research using designs that allow for the inference of causal mechanisms (e.g. experimental, longitudinal designs) would be highly informative. We also used only self-report measures. Future studies would benefit from an assessment of risk and protective factors for people who have been clinically diagnosed with pathological gambling.

Numerous measures were administered in this study. As a consequence, we used the 24-item Brief HEXACO Inventory instead of the full HEXACO-PI-R (200 items) or the intermediate versions of the scale (60 and 100 items) due to time constraints. Short personality measures suffer from inherent shortcomings, including low internal reliability (due to few items assessing each personality facet). However, previous research has shown that these measures have adequate test-retest reliability, and overlap significantly with full measures of personality (De Vries, 2013; Gosling et al., 2003). Future research using full personality inventories would be useful for fully understanding associations between the HEXACO traits and problem gambling tendencies. Another potential methodological limitation is the use of mean imputation for missing values for scales missing less than 20% of item-level data. Previous research has suggested that mean imputation is a simple and appropriate method for dealing with missing data (Shrive et al., 2006), and that a 20% cut-off for within-scale scoring is reasonable given that error estimates significantly increase after more than 20% of values are missing (e.g. Dong & Peng, 2013).

Although we used a large and diverse Western crowdsourced sample, there are some limitations to data acquired from this convenience population. Crowdsourced samples are not representative of the general community, especially when it comes to gambling research (Mishra & Carleton, 2017). Our own sample showed that 14.4% met PGSI cut-off scores for problem and pathological gambling, which is remarkably higher than typical population base rates. However, such a large proportion of at-risk and problem/pathological gamblers allows us increased variability to examine our hypotheses of interest.

Conclusions

Taken together, the results of this study affirm that risk factors are particularly important to the aetiology of problem gambling issues. These risk factors include harsh and unpredictable early developmental environments, traits associated with risk-taking generally, and high-frequency gambling engagement. Although protective factors did not explain unique variance in gambling issues above and beyond demographics, HEXACO personality traits, and risk factors, two modifiable protective factors – mindfulness and self-efficacy – appear to buffer against the development of problem gambling issues among those who gamble frequently. These results provide further support for the study of protective factors in the context of problem gambling and mental health more generally, especially given that such factors can form the basis of clinical interventions.

Conflict of interest

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Competing interests

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Constraints on publishing

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References

- Allami, Y., Vitaro, F., Brendgen, M., Carbonneau, R., & Tremblay, R. E. (2018). Identifying at-risk profiles and protective factors for problem gambling: A longitudinal study across adolescence and early adulthood. *Psychology of Addictive Behaviors*, *32*, 373–382.
- Alsubaie, M., Abbott, R., Dunn, B., Dickens, C., Keil, T., Henley, W., & Kuyken, W. (2017). Mechanisms of action in mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR) in people with physical and/or psychological conditions: A systematic review. *Clinical Psychology Review*, *55*, 74–91.
- Ashford, S., Edmunds, J., & French, D. P. (2010). What is the best way to change self-efficacy to promote lifestyle and recreational physical activity? A systematic review with meta-analysis. *British Journal of Health Psychology*, *15*, 265–288.
- Ashton, M. C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review*, *11*, 150–166.
- Ashton, M. C., Lee, K., Pozzebon, J. A., Visser, B. A., & Worth, N. C. (2010). Status-driven risk taking and the major dimensions of personality. *Journal of Research in Personality*, *44*, 734–737.
- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, *10*, 125–143.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–215.
- Beshai, S., & Parmar, P. (in press). Trait mindfulness may buffer against the deleterious effects of childhood abuse in recurrent depression: A retrospective exploratory study. *Clinical Psychologist*.
- Blaszczynski, A., Steel, Z., & McConaghy, N. (1997). Impulsivity in pathological gambling: The antisocial impulsivist. *Addiction*, *92*, 75–87.
- Block, J. H., & Block, J. (1980). The role of ego-control and ego-resiliency in the organization of behavior. In W. A. Collins (Ed.), *Development of cognition, affect, and social relations: The Minnesota symposia on child psychology* (Vol. 13, pp. 39–101). New York: Routledge.

- Bockting, C. L., Hollon, S. D., Jarrett, R. B., Kuyken, W., & Dobson, K. (2015). A lifetime approach to major depressive disorder: The contributions of psychological interventions in preventing relapse and recurrence. *Clinical Psychology Review, 41*, 16–26.
- Bohlmeijer, E., Ten Klooster, P. M., Fledderus, M., Veehof, M., & Baer, R. (2011). Psychometric properties of the five facet mindfulness questionnaire in depressed adults and development of a short form. *Assessment, 18*, 308–320.
- Bonanno, G. A., & Diminich, E. D. (2013). Annual research review: Positive adjustment to adversity—Trajectories of minimal—Impact resilience and emergent resilience. *Journal of Child Psychology and Psychiatry, 54*, 378–401.
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.
- Brunborg, G. S., Hanss, D., Mentzoni, R. A., Molde, H., & Pallesen, S. (2016). Problem gambling and the five-factor model of personality: A large population-based study. *Addiction, 111*, 1428–1435.
- Casey, L. M., Oei, T. P., Melville, K. M., Bourke, E., & Newcombe, P. A. (2008). Measuring self-efficacy in gambling: The gambling refusal self-efficacy questionnaire. *Journal of Gambling Studies, 24*(2), 229–246.
- Chandler, J., & Shapiro, D. (2016). Conducting clinical research using crowdsourced convenience samples. *Annual Review of Clinical Psychology, 12*, 53–81.
- Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational Research Methods, 4*, 62–83.
- Chmitorz, A., Kunzler, A., Helmreich, I., Tuscher, O., Kalisch, R., & Lieb, K. (2018). Intervention studies to foster resilience – A systematic review and proposal for a resilience framework in future intervention studies. *Clinical Psychology Review, 59*, 78–100.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 385–396.
- Coman, G. J., Burrows, G. D., & Evans, B. J. (1997). Stress and anxiety as factors in the onset of problem gambling: Implications for treatment. *Stress & Health, 13*, 235–244.
- Conditte, M. M., & Lichtenstein, E. (1981). Self-efficacy and relapse in smoking cessation programs. *Journal of Consulting and Clinical Psychology, 49*, 648–658.
- Crede, M., Tynan, M. C., & Harms, P. D. (2017). Much ado about grit: A meta-analytic synthesis of the grit literature. *Journal of Personality and Social Psychology, 113*, 492–511.
- Currie, S. R., Hodgins, D. C., Casey, D. M., el-Guebaly, N., Smith, G. J., Williams, R. J., ... Wood, R. T. (2012). Examining the predictive validity of low-risk gambling limits with longitudinal data. *Addiction, 107*, 400–406.
- Davydov, D. M., Stewart, R., Ritchie, K., & Chaudieu, I. (2010). Resilience and mental health. *Clinical Psychology Review, 30*, 479–495.
- de Lisle, S., Dowling, N. A., & Allen, J. S. (2014). Mechanisms of action in the relationship between mindfulness and problem gambling behaviour. *International Journal of Mental Health and Addiction, 12*, 206–225.
- de Lisle, S. M., Dowling, N. A., & Allen, J. S. (2012). Mindfulness and problem gambling: A review of the literature. *Journal of Gambling Studies, 28*, 719–739.
- De Vries, R. E. (2013). The 24-item brief HEXACO inventory (BHI). *Journal of Research in Personality, 47*, 871–880.
- De Vries, R. E., de Vries, A., & Feij, J. A. (2009). Sensation seeking, risk-taking, and the HEXACO model of personality. *Personality and Individual Differences, 47*, 536–540.
- Del Giudice, M., Gangestad, S. W., & Kaplan, H. S. (2015). Life history theory and evolutionary psychology. In D. M. Buss (Ed.), *The handbook of evolutionary psychology: Volume 1, foundations* (2nd ed., pp. 88–114). New York, NY: Wiley.
- Dickson, L., Derevensky, J. L., & Gupta, R. (2008). Youth gambling problems: Examining risk and protective factors. *International Gambling Studies, 8*, 25–47.
- Dong, Y., & Peng, C. J. (2013). Principled missing data methods for researchers. *Springerplus, 2*, 222.

- Downey, R. G., & King, C. V. (1998). Missing data in Likert ratings: A comparison of replacement methods. *The Journal of General Psychology, 125*, 175–191.
- Duckworth, A. L., Gendler, T. S., & Gross, J. J. (2016). Situational strategies for self-control. *Perspectives on Psychological Science, 11*, 35–55.
- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*, 1087–1101.
- Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the Short Grit Scale (GRIT-S). *Journal of Personality Assessment, 91*, 166–174.
- Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk: The impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature, 20*, 204–268.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., ... Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine, 14*, 245–258.
- Ferris, J. A., & Wynne, H. J. (2001). *The Canadian problem gambling index*. Ottawa, ON: Canadian Centre on Substance Abuse.
- Fletcher, D., & Sarkar, M. (2013). Psychological resilience: A review and critique of definitions, concepts, and theory. *European Psychologist, 18*, 12–23.
- Gist, M. E., & Mitchell, T. R. (1992). Self-efficacy: A theoretical analysis of its determinants and malleability. *Academy of Management Review, 17*, 183–211.
- Goodman, J. K., Cryder, C. E., & Cheema, A. (2013). Data collection in a flat world: The strengths and weaknesses of mechanical turk samples. *Journal of Behavioral Decision Making, 26*, 213–224.
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the big-five personality domains. *Journal of Research in Personality, 37*, 504–528.
- Griffiths, M. (1999). Gambling technologies: Prospects for problem gambling. *Journal of Gambling Studies, 15*, 265–283.
- Griffiths, M., Shonin, E., & Van Gordon, W. (2016). Mindfulness as a treatment for gambling disorder: Current directions and issues. *Journal of Gambling and Commercial Gaming Research, 1*, 47–52.
- Hedman-Lagerlöf, M., Hedman-Lagerlöf, E., & Öst, L. G. (2018). The empirical support for mindfulness-based interventions for common psychiatric disorders: A systematic review and meta-analysis. *Psychological Medicine, 48*, 2116–2129.
- Hill, E. M., Jenkins, J., & Farmer, L. (2008). Family unpredictability, future discounting, and risk taking. *The Journal of Socio-economics, 37*, 1381–1396.
- Hodgins, D., Peden, N., & Makarchuk, K. (2004). Self-efficacy in pathological gambling treatment outcome: Development of a gambling abstinence self-efficacy scale (GASS). *International Gambling Studies, 4*, 99–108.
- Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.
- Hoyle, R. H., Stephenson, M. T., Palmgreen, P., Lorch, E. P., & Donohew, R. L. (2002). Reliability and validity of a brief measure of sensation seeking. *Personality and Individual Differences, 32*, 401–414.
- Hu, T., Zhang, D., & Wang, J. (2015). A meta-analysis of the trait resilience and mental health. *Personality and Individual Differences, 76*, 18–27.
- Hwang, J. Y., Shin, Y.-C., Lim, S.-W., Park, H. Y., Shin, N. Y., Jang, J. H., Park, H.-Y., & Kwon, J. S. (2012). Multidimensional comparison of personality characteristics of the Big Five model, impulsiveness, and affect in pathological gambling and obsessive-compulsive disorder. *Journal of Gambling Studies, 28*, 351–362.
- Kabat-Zinn, J. (1990). *Full catastrophe living: The program of the stress reduction clinic at the university of massachusetts medical center*. New York: Delta.

- Kalisch, R., Baker, D. G., Basten, U., Boks, M. P., Bonanno, G. A., Brummelman, E., ... Geuze, E. (2017). The resilience framework as a strategy to combat stress-related disorders. *Nature Human Behaviour*, 1, 784–790.
- Kaur, I., Schutte, N. S., & Thorsteinsson, E. B. (2006). Gambling control self-efficacy as a mediator of the effects of low emotional intelligence on problem gambling. *Journal of Gambling Studies*, 22, 405–411.
- Keng, S. L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, 31, 1041–1056.
- Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., ... Hofmann, S. G. (2013). Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review*, 33, 763–771.
- Lakey, C. E., Campbell, W. K., Brown, K. W., & Goodie, A. S. (2007). Dispositional mindfulness as a predictor of the severity of gambling outcomes. *Personality and Individual Differences*, 43, 1698–1710.
- Lane, W., Sacco, P., Downton, K., Ludeman, E., Levy, L., & Tracy, J. K. (2016). Child maltreatment and problem gambling: A systematic review. *Child Abuse & Neglect*, 58, 24–38.
- Loo, J. M., Tsai, J. S., Raylu, N., & Oei, T. P. (2014). Gratitude, hope, mindfulness and personal-growth initiative: Buffers or risk factors for problem gambling? *PLOS One*, 9(2), e83889.
- Lussier, I. D., Derevensky, J., Gupta, R., & Vitaro, F. (2014). Risk, compensatory, protective, and vulnerability factors related to youth gambling problems. *Psychology of Addictive Behaviors*, 28, 404–413.
- Lussier, I. D., Derevensky, J. L., Gupta, R., Bergevin, T., & Ellenbogen, S. (2007). Youth gambling behaviors: An examination of the role of resilience. *Psychology of Addictive Behaviors*, 21, 165–173.
- Luthar, S. S., Chicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, 71, 543–562.
- Ma, S. H., & Teasdale, J. D. (2004). Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *Journal of Consulting and Clinical Psychology*, 72, 31–40.
- MacLaren, V. V., Best, L. A., Dixon, M. J., & Harrigan, K. A. (2011). Problem gambling and the five factor model in university students. *Personality and Individual Differences*, 50, 335–338.
- Maddi, S. R., Erwin, L. M., Carmody, C. L., Villarreal, B. J., White, M., & Gundersen, K. K. (2013). Relationship of hardiness, grit, and emotional intelligence to internet addiction, excessive consumer spending, and gambling. *The Journal of Positive Psychology*, 8, 128–134.
- Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist*, 56, 227–328.
- Masten, A. S., & Garmezy, N. (1985). Risk, vulnerability, and protective factors in the developmental psychopathology. In B. B. Lahey & A. E. Kazdin (Eds.), *Advances in clinical child psychology* (Vol. 8, pp. 1–51). New York, NY: Plenum.
- May, R. K., Whelan, J. P., Steenbergh, T. A., & Meyers, A. W. (2003). The gambling self-efficacy questionnaire: An initial psychometric evaluation. *Journal of Gambling Studies*, 19, 339–357.
- McGrath, D. S., Neilson, T., Lee, K., Rash, C. L., & Mandana, R. (2018). Associations between the HEXACO model of personality and gambling involvement, motivations to gambling, and gambling severity in young adult gamblers. *Journal of Behavioral Addictions*, 7, 392–400.
- McIntosh, C. C., Crino, R. D., & O'Neill, K. (2016). Treating problem gambling samples with cognitive behavioural therapy and mindfulness-based interventions: A clinical trial. *Journal of Gambling Studies*, 32, 1305–1325.
- McKeith, C. F., Rock, A. J., & Clark, G. I. (2017). Trait mindfulness, problem-gambling severity, altered state of awareness and urge to gamble in poker-machine gamblers. *Journal of Gambling Studies*, 33, 617–632.
- Mishra, S., & Carleton, R. N. (2017). Use of online crowdsourcing platforms for gambling research. *International Gambling Studies*, 17, 125–143.

- Mishra, S., Lalumière, M. L., Morgan, M., & Williams, R. J. (2011). An examination of the relationship between gambling and antisocial behavior. *Journal of Gambling Studies*, 27, 409–426.
- Mishra, S., Lalumière, M. L., & Williams, R. J. (2010). Gambling as a form of risk-taking: Individual differences in personality, risk-accepting attitudes, and behavioral preferences for risk. *Personality and Individual Differences*, 49, 616–621.
- Mishra, S., Lalumière, M. L., & Williams, R. J. (2017). Gambling, risk-taking, and antisocial behavior: A replication study supporting the generality of deviance. *Journal of Gambling Studies*, 33, 15–36.
- Mishra, S., Templeton, A., & Meadows, T. J. S. (2017). Living, fast and slow: Is life history orientation associated with risk propensity, criminal outcomes, and gambling? *Personality and Individual Differences*, 90, 22–26.
- Mrazek, P. J., & Haggerty, R. J. (Eds.). (1994). *Reducing risks for mental disorders: Frontiers for preventive intervention research*. Washington, DC: National Academy Press.
- Nower, L., Derevensky, J. L., & Gupta, R. (2004). The relationship of impulsivity, sensation-seeking, coping and substance use in youth gamblers. *Psychology of Addictive Behaviors*, 18, 49–55.
- Oei, T. P., & Goh, Z. (2015). Interactions between risk and protective factors on problem gambling in Asia. *Journal of Gambling Studies*, 31, 557–572.
- Oei, T. P. S., & Raylu, N. (2015). Cognitive and psychosocial variables predicting gambling behavior in a clinical sample. *International Journal of Mental Health and Addiction*, 13, 520–535.
- Ong, A. D., Bergeman, C. S., Bisconti, T. L., & Wallace, K. A. (2006). Psychological resilience, positive emotions, and successful adaptation to stress in later life. *Journal of Personality and Social Psychology*, 91, 730–749.
- Orford, J., Wardle, H., Griffiths, M., Sproston, K., & Erens, B. (2010). PGSI and DSM-IV in the 2007 British Gambling prevalence survey: Reliability, item response, factor structure and inter-scale agreement. *International Gambling Studies*, 10, 31–44.
- Riley, B. (2014). Experiential avoidance mediates the association between thought suppression and mindfulness with problem gambling. *Journal of Gambling Studies*, 30, 163–171.
- Rimfeld, K., Kovas, Y., Dale, P. S., & Plomin, R. (2016). True grit and genetics: Predicting academic achievement from personality. *Journal of Personality and Social Psychology*, 111, 780–789.
- Ross, L. T., & Hill, E. M. (2004). Comparing alcoholic and nonalcoholic parents on the family unpredictability scale. *Psychological Reports*, 94, 1385–1391.
- Ross, L. T., & McDuff, J. A. (2008). The retrospective family unpredictability scale: Reliability and validity. *Journal of Child and Family Studies*, 17, 13–27.
- Rounds-Bryant, J. L., Flynn, P. M., & Craighead, L. W. (1997). Relationship between self-efficacy perceptions and in-treatment drug use among regular cocaine users. *The American Journal of Drug and Alcohol Abuse*, 23, 383–395.
- Rutter, M. (1985). Resilience in the face of adversity: Protective factors and resistance to psychiatric disorder. *The British Journal of Psychiatry*, 147, 598–611.
- Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry*, 57(3), 316–331.
- Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (1999). Estimating the prevalence of disordered gambling behaviour in the United States and Canada: A research synthesis. *American Journal of Public Health*, 89, 1369–1376.
- Shead, N. W., Derevensky, J. L., & Gupta, R. (2010). Risk and protective factors associated with youth problem gambling. *International Journal of Adolescent Mental Health*, 22, 39–58.
- Shrive, F. M., Stuart, H., Quan, H., & Ghali, W. A. (2006). Dealing with missing data in a multi-question depression scale: A comparison of imputation methods. *BMC Medical Research Methodology*, 6, 57.

- Simpson, J. A., Griskevicius, V., Kuo, S., Sung, S., & Collins, W. A. (2012). Evolution, stress, and sensitive periods: The influence of unpredictability in early versus late childhood on sex and risky behavior. *Developmental Psychology, 48*, 674–686.
- Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine, 15*, 194–200.
- Spinella, M. (2007). Normative data and a short form of the Barratt Impulsiveness Scale. *International Journal of Neuroscience, 117*, 359–368.
- Stinchfield, R., McCreedy, J., Turner, N. E., Jimenez-Murcia, S., Petry, N. M., Grant, J., ... Winters, K. C. (2016). Reliability, validity, and classification accuracy of the DSM-5 diagnostic criteria for gambling disorder and comparison to DSM-IV. *Journal of Gambling Studies, 32*, 905–922.
- Sween, M., Ceschi, A., Tommasi, F., Sartori, R., & Weller, J. (2017). Who is a distracted driver? Association between mobile phone use while driving, domain-specific risk taking, and personality. *Risk Analysis, 37*, 2119–2131.
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*, 271–324.
- Tifferet, S., Agrest, S., & Shlomo, A. B. (2011). Problem gambling: An outcome of a life history strategy. *International Gambling Studies, 11*, 253–262.
- Toneatto, T., & Nguyen, L. (2007). Individual characteristics and problem gambling behaviour. In G. Smith, D. C. Hodgins, & R. J. Williams (Eds.), *Research and measurement issues in gambling studies* (pp. 279–303). Amsterdam: Elsevier.
- Toneatto, T., Pillai, S., & Courtice, E. L. (2014). Mindfulness-enhanced cognitive behavior therapy for problem gambling: A controlled pilot study. *International Journal of Mental Health and Addiction, 12*, 197–205.
- Weller, J. A., & Thulin, E. W. (2012). Do honest people take fewer risks? Personality correlates of risk-taking to achieve gains and avoid losses in HEXACO space. *Personality and Individual Differences, 53*, 923–926.
- Weller, J. A., & Tikir, A. (2011). Predicting domain-specific risk taking with the HEXACO personality structure. *Journal of Behavioral Decision Making, 24*, 180–201.
- Welte, J. W., Barnes, G. M., Wiczorek, W. F., Tidwell, M.-C. O., & Parker, J. C. (2001). Alcohol and gambling pathology among U.S. adults: Prevalence, demographic patterns, and comorbidity. *Journal of Studies on Alcohol, 62*, 706–712.
- Welte, J. W., Barnes, G. M., Wiczorek, W. F., Tidwell, M.-C., . O., & Parker, J. C. (2004). Risk factors for pathological gambling. *Addictive Behaviors, 29*, 323–335.
- Williams, R. J., & Volberg, R. A. (2010, March 31). *Best practices in the population assessment of problem gambling*. Guelph, Ontario, Canada: Report prepared for the Ontario Problem Gambling Research Centre.
- Williams, R. J., & Volberg, R. A. (2014). The classification accuracy of four problem gambling assessment instruments in population research. *International Gambling Studies, 1*, 15–28.