

## Similar roles for recovery capital but not stress in women and men recovering from gambling disorder

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*Background:* Understanding gender-related differences is important in recovery processes. Previous studies have investigated gender-related differences in factors associated with gambling disorder (GD), but none to date have considered both positive and negative resources related to recovery. Using a recovery capital (RC) framework that considers multiple resources available during recovery, this study examined gender-related similarities and differences in associations between positive resources (RC, spirituality) and negative experiences and states (stressful life events, depression, and anxiety) and GD symptom improvement. *Method:* One hundred and forty individuals with lifetime GD (101 men) were assessed using DSM-5 diagnostic criteria for GD (past-year and lifetime prior to past-year), the Brief Assessment of RC, the Intrinsic Spirituality Scale, the Stressful Life-events Scale, the Generalized Anxiety Disorder Scale, and the Patient Health Questionnaire 9 for depression. Multiple linear regression and Bayesian statistical analyses were conducted. *Results:* RC was positively and significantly associated with GD symptom improvement in women and men. Stressful life events were negatively associated with GD symptom improvement only in men. *Conclusions:* RC is an important positive resource for men and women recovering from GD and should be considered in treating both women and men. Understanding specific RC factors across gender groups and stressors, particularly in men, may aid in developing improved interventions for GD.

**Keywords:** gender, gambling disorder, recovery, recovery capital

### INTRODUCTION

Gambling disorder (GD) involves persistent problematic gambling leading to significant damage or distress (American Psychiatric Association [APA], 2013). Nationally representative samples from multiple jurisdictions have shown that between 0.1% and 2% of the population are classified as having GD (Petry, 2016). Most studies (in both nationally representative and treatment-seeking samples) have shown that women exhibit lower rates of problem or disordered gambling (Merkouris et al., 2016). For example, findings based on 43,093 individuals from the National Epidemiological Survey on Alcohol and Related Conditions (NESARC) revealed that the male–female ratio of DSM-IV pathological gambling was 2.8:1.0 (Blanco, Hasin, Petry, Stinson, & Grant, 2006). Interestingly, however, as shown in a nationally representative sample in the United States, one third of all individuals with GD recover, as indicated by remittance of GD criteria (Slutske, 2006). In an Australian sample, women are more likely (56% vs. 36%) to recover (Slutske, Blaszczynski, & Martin, 2009) than men.

Gender is an important consideration in recovery processes since obstacles and the resources needed to overcome addiction may manifest differently in women and men

(Neale, Nettleton, & Pickering, 2014). Studies examining gender-related differences in treatment-seeking or treatment-engaged individuals have suggested gender-related differences in sociodemographic characteristics, psychiatric symptoms, gambling patterns and consequences, and treatment/change motivations. Compared to men, women typically start gambling later in life but progress faster into gambling pathology (Grant & Kim, 2002), are older when starting treatment (Crisp et al., 2004; Echeburúa, González-Ortega, De Corral, & Polo-López, 2011), have higher levels of depression and anxiety (Echeburúa et al., 2011; Grant, Chamberlain, Schreiber, & Odlaug, 2012; Ronzitti, Lutri, Smith, Clerici, & Bowden-Jones, 2016), experience greater psychological distress (Khanbhai, Smith, & Battersby, 2017), and use gambling as a means to escape from these negative emotions (for a review, see Wenzel & Dahl, 2009). In comparison to women, men generally score higher on sensation seeking and impulsivity (Echeburúa et al., 2011) and report greater past-year substance use and lifetime

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histories of alcohol use and other substance use disorders (SUDs; Grant et al., 2012; Kim, Hodgins, Bellringer, & Abbott, 2016). Men tend to jeopardize or lose significant relationships, career opportunities, or jobs (Crisp et al., 2000; Granero et al., 2009); spend more money gambling (Granero et al., 2009); and report higher debts (Crisp et al., 2004) than do women. Men are also more typically motivated by hopes to win money and more influenced by social pressure (Echeburua et al., 2011; Ibáñez, Blanco, Morerya, & Sáiz-Ruiz, 2003). Both groups appear similarly motivated to seek help for gambling problems (Crisp et al., 2004; Grant & Kim, 2002), and no differences have been reported for treatment effectiveness (Zakiniaciz & Potenza, 2018). Studies of women with gambling problems suggest they may be emotionally vulnerable (Davis, 2002; Holdsworth, Nuske, & Breen, 2012) and use gambling to regain a sense of worth and identity and relieve feelings of emptiness (Hallebone, 1999; Holdsworth et al., 2012). Findings regarding marital status appear inconsistent with regard to gender-related differences (for a review, see Merkouris et al., 2016). Importantly, none of the above-cited studies tested for gender-related differences in relation to positive resources that may promote recovery.

Recovery is a central goal in treatment programs for addictive conditions (Tew, 2013). Recovery is described as a process of change and personal growth despite and beyond life stressors (Kaskutas et al., 2014). This focus shifts from pathology and illness to one that incorporates positive elements such as strengths and empowerment (Tew, 2013). Recovery capital (RC) is a holistic conceptual framework for addiction recovery embodying this shifting perspective (Cloud & Granfield, 2008). RC encompasses multiple internal and external resources (human, social, cultural, community, financial, and spiritual) that may be available to people and used throughout recovery (Cloud & Granfield, 2008; Laudet & White, 2008). RC has been negatively linked to GD severity, substance-addiction severity, and recovery stages (Burns & Marks, 2013; Gavriel-Fried, 2018; Laudet & White, 2008).

There exist little data on gender-related similarities and differences in RC in general and none for GD. One quantitative study did not find a relationship between RC and gender in individuals who had recovered from alcohol and other drugs (Best et al., 2012). A qualitative study examining 40 individuals (19 women) with current or former use of heroin found that while women were more likely to report physical and sexual abuse in their childhood and violence by partners as adults, they reported better social relationships and more access to informal support than men. The authors concluded that women did not necessarily have fewer recovery resources than men (Neale et al., 2014). Spirituality is a specific RC component added later to the original RC framework (Sterling, Slusher, & Weinstein, 2008). Spirituality refers to people's connections with something greater than themselves, often a Transcendent Being, and the way these connections may guide their attitudes and behaviors (Hodge, 2003). Among individuals with SUDs, women have been reported to display higher levels of expressive spirituality beliefs (Bliss & Ekmark, 2013), and a stronger link has been reported between spirituality and reduced odds of simultaneous poly-substance use in women (Acheampong, Lasopa, Striley, & Cottler, 2016).

The recovery process may encompass and involve personal strengths and improvements in multiple life domains to achieve a better life while coping with challenging and stressful events (Laudet & White, 2008). As such, assessing both negative and positive resources may provide a holistic and comprehensive perspective of recovery. Such a model has recently examined the contribution of RC, spirituality, stressful life events (SLEs), depression, and anxiety to symptom improvement in 140 individuals with lifetime GD (Gavriel-Fried, Moretta, & Potenza, 2019a), of whom 67 reported no current inclusionary criteria for GD (Gavriel-Fried, Moretta, & Potenza, 2019b). Symptom improvement was negatively linked to SLEs, depression, and anxiety and positively linked to RC and intrinsic spirituality. However, when all the variables were entered in a multiple regression analysis, only RC and spirituality remained as independent statistical predictors of GD symptom improvement. These findings extended an earlier study on the same sample showing that intrinsic spirituality was inversely associated with GD severity (Gavriel-Fried et al., 2019b). As stronger links between problem-gambling severity and affective disorders (e.g., major depression) have been reported in women than in men (Desai & Potenza, 2008), and SLEs have shown stronger associations with psychopathology in women than men (Armstrong, Ronzitti, Hoff, & Potenza, 2018), comprehensive holistic models investigating spirituality, RC and negative experiences and states should consider gender.

The current cross-sectional study aimed to extend previous findings by examining gender relationships using the same sample as described previously (Gavriel-Fried, 2018; Gavriel-Fried et al., 2019a, 2019b). We hypothesized that (a) all potential predictor variables would be associated with GD symptom improvement in both men and women (RC and spirituality positively, and depression, anxiety, and SLEs negatively); (b) the positive association between RC and symptom improvement would be similar for women and men; (c) the positive association between spirituality and symptom improvement would be stronger for women than for men; and (d) the negative associations between SLEs, depression, anxiety, and symptom improvement would be stronger in women than in men.

## METHODS

### *Participants and procedure*

Data were obtained from a research project on the role of RC in GD (Gavriel-Fried, 2018; Gavriel-Fried & Lev-El, 2018; Gavriel-Fried et al., 2019a, 2019b). This research project aimed to apply the concept of RC to GD and, among other things, to explore whether this concept can differentiate between recovered and non-recovered individuals with GD. The individuals were recruited from five outpatient treatment centers in Israel. These outpatient centers provide individual and group therapy (once a week each). The individual therapy includes psychosocial interventions (e.g., cognitive behavioral therapy, motivational interviews, referrals to social services, and advocacy promotion in such process), and the group therapy is based on cognitive behavioral techniques and 12-step approaches. The first appeal to the individuals

was made by the administrative staff of the treatment centers to recovered and non-recovered individuals who were in treatment (both those who terminated treatment and those who dropped out) between 2011 and 2016, and individuals who were in treatment during the study was conducted (both those who had recently applied for treatment and were in the first stage and those who were already in treatment). The names of those who expressed a willingness to participate in the study were given to the research team. Most individuals contacted by the administrative staff agreed to participate in the study. No differences between individuals who were in treatment (at different treatment stages) and those who terminated treatment (in terms of agreement to participate in the study) were observed. Interviews with the individuals were conducted between March and June 2017 by two research assistants who were social workers, and the first author, at times and in places that were convenient to the individuals. The individuals answered the questionnaires on tablets through Qualtrics software and were paid 100 Israeli shekels (roughly \$25.00) for their time. Overall, the sample included 140 individuals (72.1% men;  $n = 101$ ), ranging in age from 23 to 77 years ( $M = 49.15$ ,  $SD = 13.93$ ), with lifetime DSM-5 GD diagnoses, with no past-year DSM-5 SUDs (with possible exceptions of caffeine and tobacco), who had been treated within the past 5 years or were in treatment during the study. As efforts were made to include equal numbers of women and men, most women entering treatment in the participating centers were included. However, the sample composition reflects the tendency for fewer women (vs. men) to seek GD treatment (Ronzitti et al., 2016). The sample was composed of 67 individuals with 0 past-year DSM-5 GD criteria, 24 individuals with 1–3 criteria, and 49 individuals with 4 criteria.

### Measures

*DSM-5 GD symptom improvement.* Individuals were assessed for past-year and lifetime (prior to past-year) GD (APA, 2013). Each individual was asked to indicate DSM-5 GD symptoms for the past-year and their lifetime (prior to past-year) separately. Symptom improvement was calculated by subtracting the criteria for the previous year from the lifetime criteria. Higher scores indicated greater symptom improvement (Gavriel-Fried et al., 2019a). For this study, the reliability was  $\alpha = .88$ .

*Brief Assessment of Recovery Capital (BARC).* The BARC (Vilsaint et al., 2017) is a 10-item abridged version of the Assessment of Recovery Capital (ARC) Scale (Groshkova, Best, & White, 2013) that has been used on this sample (Gavriel-Fried, 2018; Gavriel-Fried et al., 2019a). Each item queries one conceptual domain of RC (e.g., social support, recovery experience, coping and life functioning, and global physical health). For the purposes of this study, three changes were made: (a) items related to substance use were rephrased to gambling, (b) individuals were asked to relate to the past year rather than the time they completed the scale, and (c) the 6-point scale was converted into 5-point scale ranging from “do not agree at all” (1) to “strongly agree” (5). After omitting two items with low loadings, the scale showed good fit indices and a reliability of  $\alpha = .75$  (Gavriel-Fried, 2018). Higher scores represented higher RC.

*The Intrinsic Spirituality Scale (ISS).* The six-item ISS is an abbreviated and modified version of the Intrinsic Religion Scale (Allport & Ross, 1967) that assesses the extent to which spirituality serves as a central motivation in theistic and non-theistic groups outside and within religious contexts (Hodge, 2003). Each item is a phrase completion with a score ranging from 0 to 10. For example, “My spiritual beliefs affect” – “(0) no aspect of my life” to “(10) absolutely every aspect of my life.” The score is calculated as the mean. A higher score indicates a greater level of intrinsic spirituality. The scale was validated for this sample and revealed good fit indices (Gavriel-Fried et al., 2019b). The scale reliability in this study was  $\alpha = .95$ .

*The Generalized Anxiety Disorder Scale (GAD-7).* This scale assesses the presence of GAD in the previous 2 weeks (Spitzer, Kroenke, Williams, & Löwe, 2006). Responses to 7 items range from 0 (*not at all*) to 3 (*nearly every day*). Scores are summed. Higher scores indicate higher anxiety levels. The reliability in this study was  $\alpha = .91$ .

*The Patient Health Questionnaire-9 (PHQ-9).* This nine-item scale measures the severity of depression in the previous 2 weeks, based on DSM-IV criteria for depressive episodes (Kroenke & Spitzer, 2002). Answers range from 0 (*not at all*) to 3 (*nearly every day*). Higher PHQ-9 scores reflect more severe depression. The reliability in this study was  $\alpha = .84$ .

*Stressful life events.* Twelve different types of SLEs that may have occurred in the past 12 months were assessed previously (Armstrong et al., 2018; Gavriel-Fried et al., 2019a). SLEs assessment included stressors in a variety of general life domains (health, social, job, and legal). The scale was developed and used in the NESARC (Dawson, Grant, & Ruan, 2005). Individuals answer all items on a binary scale. The items are summed. Higher scores indicate a higher number of past-year SLEs. The reliability in this study was  $\alpha = .59$ .

### Statistical analyses

Analyses were performed using R software (Team, 2018). Pearson’s correlation coefficients were calculated between GD symptom improvement, RC, intrinsic spirituality, SLEs, depression, and anxiety in women and men separately. Linear model analysis, considering gender as a statistical predictor, was performed to compare the variables between groups. Because women and men differed significantly in age ( $t = -6.62$ ,  $p < .001$ , Cohen’s  $d = -1.25$ ), with women older than men (Table 1), age was included as covariate in all subsequent analyses.

To study the relative contributions of RC, intrinsic spirituality, SLEs, depression, and anxiety (i.e., statistical predictors) to GD symptom improvement for women and men, respectively, two separate multiple regression analyses were employed. The maximum likelihood method was employed to analyze the contribution of statistical predictors in explaining GD symptom improvement, and effect sizes are reported in terms of Cohen’s  $f^2$ , with a  $f^2 \geq 0.15$  indicating a moderate or greater effect size and a  $f^2 \geq 0.35$  indicating a large effect size (Cohen, 1977). Multicollinearity was monitored by examining both the tolerance and the variance inflation factor (VIF). In both women and men,

Table 1. Means, SDs, and intercorrelations for women and men

	Mean	SD	Pearson's correlation coefficients						
			1	2	3	4	5	6	
<i>Women (n = 39)</i>									
Age (years)	60.10	10.50							
1. GD symptom improvement	4.08	2.86	1						
2. RC	33.40	5.22	.44**	1					
3. Intrinsic spirituality	5.90	2.92	.17	.00	1				
4. Stressful life events	2.85	2.03	.06	-.11	-.14	1			
5. Depression	5.79	5.08	-.26	-.57***	.05	.41**	1		
6. Anxiety	5.23	5.84	-.21	-.41**	.03	.50**	.72***	1	
<i>Men (n = 101)</i>									
Age (years)	44.90	12.80							
1. GD symptom improvement	5.30	3.40	1						
2. RC	33.10	5.81	.55***	1					
3. Intrinsic spirituality	5.94	3.16	.32**	.38***	1				
4. Stressful life events	2.36	1.91	-.40***	-.43***	-.06	1			
5. Depression	6.06	5.93	-.43***	-.66***	-.02	.47***	1		
6. Anxiety	4.58	5.29	-.32**	-.50***	.07	.39***	.86***	1	

Note. GD: gambling disorder; RC: recovery capital.

\*\**p* < .01. \*\*\**p* < .001.

the tolerance and VIF measures indicated that multicollinearity was not a concern (women: RC, Tolerance = 0.65, VIF = 1.55; ISS, Tolerance = 0.96, VIF = 1.04; SLEs, Tolerance = 0.69, VIF = 1.44; depression, Tolerance = 0.38, VIF = 2.65; anxiety, Tolerance = 0.43, VIF = 2.33; men: RC, Tolerance = 0.42, VIF = 2.40; ISS, Tolerance = 0.76, VIF = 1.32; SLEs, Tolerance = 0.76, VIF = 1.32; depression, Tolerance = 0.18, VIF = 5.51; anxiety, Tolerance = 0.25, VIF = 4.07). Residual plots were employed to evaluate the normality and homogeneity of the variance. In both women and men, the normal P–P plot of the standardized residuals showed points that were not completely on the line, but close, and the scatterplot of the standardized residuals showed that the data met the assumptions of homogeneity of variance and linearity.

As an additional exploratory analysis, we examined the possible contributions of potential statistical predictors and their interactions on GD symptom improvement in women and men using a Bayesian approach. Bayesian inference is considered a powerful procedure for testing hypotheses in psychology in general (Wagenmakers et al., 2018) and in addiction science in particular (West, 2016), since it permits quantification and assessment of evidence both in favor of the null hypothesis and alternative hypotheses (Wagenmakers et al., 2018). We explored whether not only the statistical predictors but also the two-way interactions between predictors provided adequate descriptions of the distributions generating the observed GD symptom improvement in women and men separately. Specifically, a Bayesian adaptive sampling for variable selection and model averaging (Clyde, Ghosh, & Littman, 2011) was employed. All possible combinations between predictors were estimated by a Markov chain Monte Carlo (MCMC) sampling method (Hoeting, Madigan, Raftery, & Volinsky, 1999) using the Zellner–Siow Cauchy prior to the coefficients (i.e., all Bayes’ factors were compared to the null model) and a uniform prior distribution over the models;

i.e., by assigning equal probabilities to all models, using the R package BAS (Clyde, 2018). As an extension of Bayesian inference, this approach provides a coherent and systematic mechanism that accounts for model uncertainty during the process of variable selection by considering both parameter uncertainty through the prior distribution and model uncertainty, and obtains posterior distributions for the model parameters and the model themselves using Bayes’ theorem, hence allowing for direct model selection, combined estimation, and prediction (Clyde et al., 2011; Fragoso, Bertoli, & Louzada, 2018).

Finally, to test regression slope homogeneity between genders, we computed the Bayes’ factor by 100,000 MCMC simulations in the R package Bayes’ factor (Morey & Rouder, 2018) for all restrictions of the full model (i.e., including GD symptom improvement as the dependent variable and the statistical predictors that were selected from previous analyses and were in common across gender groups, and their interaction with gender as independent variables) against the null hypothesis that all effects were 0.

### Ethics

All procedures were approved by Tel Aviv University and the Ministry of Welfare Review Board, and were conducted in accordance with the ethical standards of the American Psychological Association in accordance with the Declaration of Helsinki. The participants were informed of the aims of the study and provided written informed consent.

## RESULTS

### Descriptive statistics

One hundred and nineteen participants (85 men) demonstrated an improvement in GD symptoms; i.e., past-year

GD < lifetime prior to past-year GD; 20 participants (15 men) did not change in terms of GD symptoms, i.e., past-year GD = lifetime prior to past-year GD; only one man reported an increase in GD symptoms, i.e., past-year GD > lifetime prior to past-year GD. Pearson's correlation coefficients showed no significant associations between past-year and lifetime prior to past-year GD (total sample:  $r = .08, p = .37$ ; women:  $r = .18, p = .26$ ; men:  $r = .07, p = .50$ ).

Descriptive statistics and intercorrelations are reported in Table 1.

*Hypothesis testing*

Linear model analysis revealed lower GD symptom improvement in women than in men; while statistically significant, the effect size was low ( $t = -1.98, p = .049$ , Cohen's  $d = 0.37$ ). No statistically significant gender-related differences were found for RC ( $t = 0.25, p = .81$ , Cohen's  $d = -0.05$ ), intrinsic spirituality ( $t = -0.07, p = .95$ , Cohen's  $d = 0.01$ ), SLEs ( $t = 1.34, p = .18$ , Cohen's  $d = -0.25$ ), depression ( $t = -0.25, p = .81$ , Cohen's  $d = 0.05$ ), or anxiety ( $t = 0.63, p = .53$ , Cohen's  $d = -0.12$ ).

*Women*

To test associations between potential statistical predictors and GD symptom improvement, a multiple regression was employed. As shown in Table 2, only RC was a statistically significant predictor of GD symptom improvement (RC:  $B = 0.21 \pm 0.11, \beta = 0.39, p = .006, f^2 = 0.2$ ).

Associations between potential statistical predictors, their two-way interactions, and GD symptom improvement were modeled using a Bayesian approach. Only RC, intrinsic spirituality, and SLEs showed marginal posterior inclusion probabilities (pip) > 0.5 (RC: pip = 0.895; ISS: pip = 0.604; SLEs: pip = 0.582); therefore, we focused on these variables in the subsequent analyses. Specifically, RC statistically predicted GD symptom improvement in the three top models (i.e., the models with highest Bayes' factors). On

the contrary, intrinsic spirituality and SLEs appeared only in the second and the third top models, respectively (see Table 3 for further details on the estimated models). Considering the top three models, the estimated coefficients and standard deviations under Bayesian model averaging were obtained (Table 3) and the variability of the parameter estimates and associated inferences were computed via 95% Bayesian credible intervals (95% BCIs), which showed higher levels of RC to be associated with greater GD symptom improvement ( $\beta = 0.23, 95\% \text{ BCI} = [0.06, 0.39]$ ). Conversely, there was no evidence for associations between GD symptom improvement and intrinsic spirituality or SLEs (intrinsic spirituality:  $\beta = 0.05, 95\% \text{ BCI} = [-0.04, 0.36]$ ; SLEs:  $\beta = 0.03, 95\% \text{ BCI} = [-0.13, 0.36]$ ).

*Men*

As reported in Table 2, only RC and SLEs significantly predicted GD symptom improvement (RC:  $B = 0.17 \pm 0.07, \beta = 0.30, p < .001, f^2 = 0.41$ ; SLEs:  $B = -0.35 \pm 0.17, \beta = -0.20, p = .02, f^2 = 0.18$ ). Since the SLEs included different kind of stressors and SLEs were associated with symptom improvement in men but not women, similar to previous studies (e.g., Armstrong et al., 2018), we also explored whether the statistically significant effect of SLEs on symptom improvement in men depended on specific subtypes of stressors. Post-hoc analyses revealed that out of the 12 SLEs, stressors relating to illness of loved ones (item 2,  $B = -1.97 \pm 0.71, \beta = -0.26, t = -2.76, p = .007$ ); troubles at work with a boss or coworker (item 6,  $B = -1.84 \pm 0.91, \beta = -0.20, t = -2.01, p = .047$ ); conflicts with a neighbor, friends, or relatives (item 9,  $B = -3.00 \pm 0.94, \beta = -0.31, t = -3.2, p = .002$ ); and financial crises (item 10,  $B = -2.64 \pm 0.66, \beta = -0.37, t = -3.98, p < .001$ ) significantly predicted (at  $p < .05$ ) symptom improvement in men. Two of these items (those relating to conflicts and financial crises) remained significant after a Bonferroni correction. Bayesian adaptive sampling for variable selection and model averaging revealed that RC, intrinsic spirituality, SLEs, and depression had marginal pip > 0.5

Table 2. Multiple regression analyses in women and men

	$B \pm SE$	$\beta$	$F$	$p$	$f^2$
<i>Women</i>					
Age	$0.01 \pm 0.05$	0.05	0.23	.64	0.00
RC	$0.21 \pm 0.11$	0.39	8.13	<.01**	0.20
Intrinsic spirituality	$0.18 \pm 0.16$	0.19	0.96	.33	0.001
Stressful life events	$0.31 \pm 0.26$	0.22	0.83	.37	0.00
Depression	$-0.01 \pm 0.14$	-0.02	0.24	.63	0.04
Anxiety	$-0.07 \pm 0.11$	-0.15	0.38	.54	0.02
<i>Men</i>					
Age	$0.01 \pm 0.02$	0.03	0.08	.80	0.00
RC	$0.17 \pm 0.07$	0.30	44.33	<.001***	0.41
Intrinsic spirituality	$0.21 \pm 0.10$	0.20	2.42	.12	0.10
Stressful life events	$-0.35 \pm 0.17$	-0.20	6.06	.02*	0.18
Depression	$-0.10 \pm 0.11$	-0.18	1.30	.26	0.22
Anxiety	$0.03 \pm 0.11$	0.04	0.06	.80	0.10

Note. B: unstandardized regression coefficient; SE: standard error;  $\beta$ : standardized regression coefficient; RC: recovery capital; F: F value; p: p value;  $f^2$  = Cohen's  $f^2$ .

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

Table 3. Bayesian adaptive sampling for variable selection and model averaging

	Women (n = 39)					Men (n = 101)				
	pip	Post β (mean ± SD)	Model			pip	Post β (mean ± SD)	Model		
			1	2	3			1	2	3
RC	0.895	0.23 ± 0.1	1	1	1	0.904	0.210 ± 0.1	1	1	1
Intrinsic spirituality	0.604	0.05 ± 0.1	0	1	0	0.776	0.002 ± 0.2	0	1	1
Stressful life events	0.582	0.03 ± 0.1	0	0	1	0.823	-0.38 ± 0.2	1	1	1
Depression	0.467	0	0	0	0	0.571	-0.08 ± 0.1	0	0	1
Anxiety	0.487	0	0	0	0	0.443	0	0	0	0
RC × Intrinsic spirituality	0.112	0	0	0	0	0.102	0	0	0	0
RC × Stressful life events	0.159	0	0	0	0	0.112	0	0	0	0
RC × Depression	0.093	0	0	0	0	0.066	0	0	0	0
RC × Anxiety	0.128	0	0	0	0	0.059	0	0	0	0
Intrinsic spirituality × Stressful life events	0.113	0	0	0	0	0.096	0	0	0	0
Intrinsic spirituality × Depression	0.060	0	0	0	0	0.195	0.008 ± 0.02	0	0	1
Intrinsic spirituality × Anxiety	0.074	0	0	0	0	0.164	0	0	0	0
Stressful life events × Depression	0.092	0	0	0	0	0.073	0	0	0	0
Stressful life events × Anxiety	0.086	0	0	0	0	0.051	0	0	0	0
Depression × Anxiety	0.048	0	0	0	0	0.084	0	0	0	0
Bayes' factor			1	0.39	0.27			1	0.71	0.28
R <sup>2</sup>			0.19	0.22	0.20			0.33	0.35	0.39
Posterior probabilities			0.08	0.05	0.03			0.05	0.07	0.05

Note. For each model, the included predictors are indicated as either “1” or “0,” where “1” represents inclusion of the predictor in the model and “0” represents its exclusion. RC: recovery capital; pip: marginal posterior inclusion probabilities; Post β (mean ± SD) posterior mean and standard deviation for each coefficient.

(RC: pip = 0.904; intrinsic spirituality: pip = 0.776; SLEs: pip = 0.823; depression: pip = 0.571). Therefore, we focused on these variables in subsequent analyses. RC and SLEs appeared as statistical predictors of GD symptom improvement in all three top models (i.e., the models with highest Bayes' factors). Conversely, intrinsic spirituality and depression appeared in only two and one of the three top models, respectively (see Table 3 for further details on the estimated models). Thus, considering the top three models, we obtained estimated coefficients and standard deviations for the intercept, RC, intrinsic spirituality, SLEs, and depression under Bayesian model averaging (Table 3). The 95% BCI showed that higher levels of RC were associated with greater GD symptom improvement (β = 0.21, 95% BCI = [0.06, 0.36]) and higher levels of SLEs were associated with lower levels of GD symptom improvement (β = -0.38, 95% BCI = [-0.69, -0.05]). Conversely, there was no evidence for an association between GD symptom improvement and intrinsic spirituality or depression (intrinsic spirituality: β = 0.002, 95% BCI = [-0.51, 0.35]; depression: β = -0.08, 95% BCI = [-0.42, 0.00]).

*Slope homogeneity between gender groups*

RC emerged as the only statistical predictor of GD symptom improvement in both women and men; therefore, only RC was considered in the analysis of slope homogeneity between gender groups. Model comparison analysis using the Bayes' factor showed that the model with both RC and the RC × Gender interaction as predictors (Bayes' factor = 14,945,852) performed less well, i.e., accounted 4.50 times less well for the data than the model with no interaction (Bayes' factor =

67,313,907). These results suggest that RC related to GD symptom improvement similarly in women and men.

DISCUSSION

Using both frequentist and Bayesian approaches, the main findings indicate that RC was positively associated with GD symptom improvement in both women and men. The positive association between RC and symptom improvement was similar for women and men. SLEs (mainly conflicts with a neighbors, friends or relatives, and financial crises) were negatively associated with GD symptoms improvement solely in men. The hypotheses related to the associations between spirituality, depression, anxiety, and GD symptom improvement were not supported, since they were not retained in the best-fitting models for either women or men.

In general, the findings highlight the importance of RC in GD and echo previous studies conducted in individuals with substance addictions showing that individuals who described themselves as abstainers and those who had recovered exhibited more RC resources (Best, McKitterick, Beswick, & Savic, 2015; Laudet & White, 2008). More specifically, the findings suggest interesting similarities and differences between women and men in factors that are related (or unrelated) to recovery from GD. The main findings outline the importance of RC in relation to symptom improvement in both women and men and strengthen findings from the substance addiction field, which have concluded that women and men have similar levels of recovery resources (Best et al., 2012). However, it is

important to note that this finding emerged from probing RC on a unidimensional scale that did not differentiate between different kinds of RC resources. Although the findings showed similar means in the total levels of RC between gender groups (means of 33.4 for women and 33.1 for men), future studies should examine possible gender-related differences using RC scales that distinguish RC domains or through other methodologies such as qualitative and mixed methods approaches. Such studies may help determine whether there are gender-related differences in specific RC domains that may manifest differently in women and men as was found in a qualitative study that analyzed interviews of 40 individuals with prior or current heroin use (Neale et al., 2014). In this study, women reported more access to informal support (including material assistance and housing), better social relationships, and money management than men.

In contrast to our hypotheses, significant associations were mostly not observed between spirituality, depression, anxiety, and GD symptom improvement in women and men, with several exceptions. In both women and men, Bayesian analysis showed spirituality to have a posterior probability to explain symptom improvement higher than the case, suggesting a possible influence in both gender groups. However, 95% BCIs did not support an effect for spirituality on symptom improvement in either women or men. One explanation may involve the small sample size. Hence, additional studies should be conducted on larger samples of women and men. The findings for depression and anxiety may also relate to the temporal durations specified in the variables employed in this study, the outcome measures used, and the characteristics of the sample. The depression and anxiety measures were assessed over a short and recent temporal duration, whereas longer timeframes may have more relevance for predicting recovery. In addition, potential risk factors that may predict problem-gambling severity tend to appear at the onset of gambling behavior (González-Ortega, Echeburúa, Corral, Polo-López, & Alberich, 2013), while our sample mostly included individuals who had recovered (91 had zero or fewer than 4 past-year DSM-5 inclusionary criteria for GD). Finally, while most studies have probed depression and anxiety in relation to GD severity and problems (Barrault, Bonnaire, & Herrman, 2017; Jauregui, Onaindia, & Estévez, 2017; Kessler et al., 2008), this study measured these in relation to symptom improvement – a measure that reflects recovery. Hence, although there are gender-related differences with respect to gambling behaviors and problem-gambling severity, there may exist more similarities than differences across gender groups with respect to factors related to recovery.

The main difference between women and men with respect to statistically predicting recovery involved SLEs. Specifically, we found a negative association between SLEs and GD symptom improvement in men but not women. Previous studies on gender-related differences with respect to SLEs appear inconsistent (Merkouris et al., 2016). This might be due to differences related to the periods in which the life events were measured. For example, using a methodology based on recount of life trajectories, Andronicos et al. (2015) found that women with gambling problems experienced more childhood abuse than men with gambling problems; during adulthood, women were more likely to be victims of marital or

intimate partner violence, whereas men experienced difficulties in the social field and their professional lives. Interestingly, when our findings based on past-year SLEs were examined per item, differences emerged in those relating to conflicts with friends and relatives and financial crises. This finding echoes previous studies, which have found that men with gambling problems have more arguments with friends and family and more debts than women (Crisp et al., 2004; Granero et al., 2009), and have noted gender-related differences with respect to types of debt, where women tended to have credit debt and men higher indebtedness to bookies or loan sharks (Potenza et al., 2001). Debts and conflicts may lead to stress that negatively relates to GD symptom improvement, as was found in this study among men. Hence, interventions that target managing debts and navigating interpersonal conflicts may be especially relevant to promoting recovery in men with GD. Importantly, for men, the association between SLEs and symptom improvement was larger than the association between RC and symptom improvement. This finding suggests that in women, positive features may contribute to symptom improvement, whereas in men, both positive and negative features contribute to symptom improvement. Additional studies should examine these relationships over time and in larger samples.

Several limitations should be considered when interpreting the current findings. This study was cross-sectional, precluding the drawing of causal conclusions. The data were collected through self-report questionnaires and may be subject to biases (e.g., recall) of overreporting and underreporting. Lifetime prior to past-year GD criteria were measured, and these may have been experienced at different points in time. As such, this measure is not sensitive to capturing when individual GD criteria may have temporally co-occurred. Future studies should examine more precisely the periods during which people experience the most severe problems. Anxiety and depression symptoms were measured in relation to the past 2 weeks, RC and SLEs were measured in relation to the past 12 months, and intrinsic spirituality was assessed as the extent it serves as an organizing motive of individuals' lives more generally. The findings might be biased due to the small sample size and associated statistical power, especially among women. In this study, no information was collected on the differences between individuals who successfully completed the treatment programs and those who dropped out in terms of willingness and responsiveness to participate in the study. Such data may shed light on potential self-selection bias if those who completed treatment were more motivated to participate in the study. Future studies should thus include equal numbers of individuals who completed treatment and individuals who dropped out and investigate directly potential differences in these groups. In addition, some important proximal (e.g., age of gambling onset and duration of GD) or distal (e.g., sensation seeking and impulsivity) predictor variables were not included in analyses. The  $\alpha$  value for the SLEs instrument was relatively low, and future studies may consider other scales. Finally, the sample was drawn from individuals applying for treatment and those who had been in recovery for up to 5 years; hence, more studies should be conducted on individuals in other recovery stages (early recovery) and on individuals who recover naturally (without formal intervention).

Overall, the findings pinpoint gender-related similarities and differences with regard to negative events and experiences as well as positive resources that can contribute to recovery from GD. The findings underscore the relevance of RC for GD recovery across gender groups and suggest that clinicians should consider a holistic and strengths-based approach in therapeutic settings. More specifically, therapists should emphasize and strengthen the multiple social, individual, community, and financial resources through therapy by providing broad-based services and treatment approaches relating to resources and obstacles inherent to the recovery process from GD. The main difference between genders was related to specific stressors that may hinder recovery from GD in men. Treatment providers should be aware of this difference and consider the greater impact of specific stressors on recovery from GD in men. Future studies should replicate and extend these findings in larger samples and in other subgroups of individuals recovering from GD to further enhance our understanding of factors influencing recovery from GD in women and men, and translate this understanding into improved interventions that may promote recovery.

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**Authors' contribution:** BG-F was responsible for the study design. She collected the data and wrote the manuscript. TM contributed to the analytic approach, conducted the statistical analysis, and wrote "Results" section. MNP advised on the data analyses and made critical comments on the final version. All authors approved the final version of the manuscript.

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