

The Roles of Need Satisfaction and Passion in Symptoms of Behavioral Addiction: The Case of Video Gaming and Gambling

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Integrating theoretical frameworks on psychological need satisfaction and passion, we suggest that a pathway toward behavioral addiction is the development of an obsessive passion for an activity. In two studies with samples of video game players (Study 1) and gamblers (Study 2) we considered need satisfaction and passion as motivational antecedents of symptoms of behavioral addiction. Additionally, Study 2 focused on different sources of need satisfaction (global and context-specific) to better understand the origins of passion and its role in behavioral addiction. Results of both studies suggested that harmonious passion for the activity was positively related to life satisfaction and unrelated to symptoms of behavioral addiction, while obsessive passion was positively related to symptoms of addiction. Furthermore, both studies found that need satisfaction within the activity was positively associated with the development of passion. However, lower levels of global need satisfaction were uniquely positively associated with higher levels of symptoms of behavioral addiction through the indirect effect of obsessive passion (Study 2). Overall, these findings point to a compensatory model such that high levels of obsessive passion may lead to symptoms of behavioral addiction when context-specific need satisfaction is high and global need satisfaction is low. This represents the first research to test the role of need satisfaction and passion in symptoms of behavioral addiction in two domains.

Keywords: need satisfaction, dualistic model of passion, gambling, video gaming, behavioral addiction

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The costs of addiction are astounding, not only for the individual (Männikkö et al., 2020), but for society at large (Graham et al., 2017). As such, the desire to further understand disorders of behavioral addiction in order to adequately treat and prevent them seems warranted. It is increasingly recognized that people can become behaviorally dependent on activities (Alavi et al., 2012; Baumeister & Nadal, 2017). For example, *DSM-5* placed Gambling Disorder in the behavioral addictions category, to reflect new research that has linked gambling to substance-related disorders in clinical expression, comorbidity, and treatment (Reilly & Smith, 2013). In the present article, we suggest that a pathway toward behavioral addiction is the development of an obsessive passion for an activity that occurs when need satisfaction within the activity

(i.e., contextual need satisfaction) is high but need satisfaction in general life (i.e., global need satisfaction) is low.

Passion and Behavioral Addiction

Passion, as defined by Vallerand (2015), is thought of as a strong inclination toward an interesting and important activity, in which one invests time and energy. According to the Dualistic model of Passion (DMP; Vallerand, 2015) the manner in which a valued activity becomes internalized in the individual's identity gives rise to two types of passion: an obsessive passion (OP) and a harmonious passion (HP).

Obsessive passion (OP) for an activity is internalized in a controlled way, giving rise to a relentless involvement with the activity. OP is experienced as a feeling of having to engage with the activity - although individuals with a OP love (or at least like) their favorite activity, they feel compelled to engage in it, often to the detriment of other important life domains and in conflict with other valued goals and responsibilities (Mageau & Vallerand, 2007; Seguin-Lévesque et al., 2003). While OP

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can lead to some activity-specific benefits such as improved context-specific performance (Vallerand et al., 2008; 2007; Verner-Filion et al., 2017), these benefits usually do not outweigh the long-term costs associated with OP.

OP is contrasted with harmonious passion (HP) which is experienced as a feeling of wanting to engage with the activity. HP is characterized by a balanced involvement with the activity and is internalized in an autonomous way. The person feels free to engage in the activity when desired, as well as refrain from the activity as circumstances require (Vallerand, 2015). Thus, the person enjoys the benefits of engaging in the passionate activity (e.g., positive emotions) without jeopardizing other important goals, obligations, and responsibilities. Research demonstrates that HP is consistently associated with positive outcomes, such as increased life satisfaction (e.g., Lafrenière et al., 2009) whereas activities shaped by OP undermine well-being in a number of domains (Curran et al., 2015; Vallerand, 2015).

Past research has used the DMP to study behavioral addiction, consistently finding that OP is positively associated to markers of addiction and problematic consequences whereas HP for an activity is not. For example, Steers et al. (2015) found that while both HP and OP were positively related to alcohol and marijuana consumption across two independent samples of college students, OP was associated with greater use of these substances (Studies 1 & 2) and greater substance-related problems (Study 1). Similarly, Davis and Arterberry (2019) found that obsessive passion was associated with greater frequency of marijuana consumption and more severe consequences.

Relatedly, in the context of behavioral addiction and physical fitness, researchers have found that individuals who are obsessively passionate about exercising are at increased risk for experiencing exercise addiction (Kovacsik et al., 2018) and express controlled motivation for exercising (Sicilia et al., 2018). Applications of the DMP to virtual gaming contexts further suggest that the quality of passion (HP or OP) can have implications for the well-being of individual, such that HP for gaming has is associated with greater positive affect and life satisfaction, while OP for gaming has been associated with negative affect while gaming, greater time spent gaming, problematic behaviors, and negative physical symptoms (e.g., dizziness, numbness, sleeping problems; Lafrenière et al., 2009; Przybylski et al., 2009; Seguin-Lévesque et al., 2003; Wang et al., 2008). While obsessive passion is conceptually related to substance disorder criteria, including difficulty in controlling consumption, it has no direct overlap with other symptoms of substance use disorders and is conceptually considered to be an antecedent to behavioral addiction (e.g., Steers et al., 2015).

Need Satisfaction as a Determinant of Passion

In order for an activity to become a passion, the activity must be highly valued which depends on its ability to satisfy people's basic psychological needs: the need for autonomy (acting freely and in line with values/interests), the need for competence (a sense of efficacy in daily life) and the need for relatedness (feeling meaningfully connected to others).

Psychological need satisfaction is essential for psychological wellness and thriving (Ryan & Deci, 2017) and is positively associated with positive emotions (Sheldon et al., 1996); feelings of

vitality (Ryan & Frederick, 1997); and even physical health (Gunnell et al., 2016). Importantly, activities that afford need satisfaction tend to be more valued and are more likely to become passions (Vallerand, 2015). Activity-based need satisfaction also facilitates the internalization of an activity into the self (Kovacsik et al., 2018; Lalande et al., 2017).

Past research has demonstrated that high need satisfaction within the context of the activity is positively related to both types of passion. In four studies with different research designs (cross-sectional, quasi-experimental, longitudinal) and different passions (e.g., sport, music, work), Lalande et al. (2017) demonstrated that need satisfaction within the activity related positively to both a HP and OP, although the positive relation with HP was stronger. Lalande and colleagues (2017) also investigated the effects of need satisfaction outside the purview of the activity (e.g., life in general) on passion. Their results indicated that general need satisfaction outside of the activity was negatively related to OP, suggesting that individuals were less likely to have higher levels of obsessive passion about an activity when their needs were satisfied in other life domains. Consequently, Lalande and colleagues (2017) suggested that OP may represent a form of compensatory striving for psychological need satisfaction, especially when global need satisfaction is low. In contrast, there was no association between global need satisfaction and harmonious passion.

Recent research has highlighted the risk for behavioral addiction in situations where need satisfaction in an individual's everyday life is low (i.e., the person experiences little autonomy, competence and relatedness in their life generally), but need satisfaction within the context of the passionate activity is high, making these activities more susceptible to behavioral addiction (Rigby & Ryan, 2011; Mills et al., 2018). For example, video games allow players considerable choices and options with regards to their avatar and missions (satisfying the need for autonomy), are designed to be optimally challenging (satisfying the need for competence) and promote social relationships (satisfying the need for relatedness). Across two samples of adult videogame players, Bender and Gentile (2019) found that in-game need satisfaction was associated with higher levels of Internet Gaming Disorder (IGD), whereas needs satisfaction in life in general was associated with lower levels of IGD. Similarly, Allen and Anderson (2018) found that low global need satisfaction and high contextual need satisfaction (in video gaming) were associated with higher gaming disorder scores among undergraduate students in the United States. Allen and Anderson (2018) also found that the more participants' contextual need satisfaction exceeded their global need satisfaction, the higher they scored on the gaming disorder scale. Importantly, need satisfaction at the global level seemed to buffer the effects of contextual need satisfaction.

Since activity-based need satisfaction can transform the activity into a passion (Kovacsik et al., 2018; Lalande et al., 2017), we ask here if addictive behaviors can result from contextual need satisfaction and obsessive passion for an activity.

The Present Research

The aim of the current research was to examine need satisfaction and passion as possible antecedents to symptoms of behavioral addiction. This was done by integrating previous research

linking compensatory need satisfaction to the development of different types of passion (Lalande et al., 2017); OP to behavioral addiction (e.g., Kovacsik et al., 2018); and need satisfaction to media overuse (Rigby et al., 2011).

While previous studies have focused either exclusively on virtual gaming or gambling as models for behavioral addiction, we sought to generalize the research on need satisfaction and passion to both contexts of video gaming (Study 1) and gambling (Study 2) and in samples of different ages. In Study 1, we first sought to replicate past research (Lalande et al., 2017) by hypothesizing that need satisfaction at the contextual level (video gaming) would be positively related to both types of passion (HP and OP). In turn, we hypothesized that HP would be positively related to life satisfaction (e.g., Lafrenière et al., 2009) while OP would be positively related to symptoms of video gaming addiction. In Study 2, we hypothesized that the combination of low need satisfaction at the global level (life in general) and high need satisfaction at the contextual level (gambling) would be positively associated with OP, and in turn, symptoms of behavioral addiction for the activity (gambling). To confirm the robustness of the expected associations in Study 2, we planned to control for potentially confounding variables, such as time spent gambling, as well as personality traits associated with gambling.

Study 1

The aim of Study 1 was to assess the tenability of a structural model demonstrating the effects of context-specific need satisfaction on passion, life satisfaction and symptoms of behavioral addiction in a sample of videogame players. In line with the above reasoning, we hypothesized that context-specific need satisfaction would be positively associated with both HP and OP. We hypothesized that HP for gaming would be related to greater life satisfaction as a result of engaging with passion and would not be related to symptoms of behavioral addiction. Meanwhile we hypothesized that OP for gaming would be associated with decreased life satisfaction and greater symptoms of video gaming addiction. In addition, to strengthen the claims of our theoretical model, we also sought to establish in a preliminary analysis that obsessive passion was distinct from experiencing symptoms of behavioral addiction.

Method

Participants and Procedure

Participants for this study were recruited online through websites and forums dedicated to video gaming. Participants were informed that completing this study was voluntary and they would not receive incentive in exchange for their participation. The final sample was comprised of 377 gamers with a mean age of 26.15 years ($SD_{age} = 8.26$ years). There were more males ($n = 216$) than females ($n = 92$) in the sample, although 69 participants did not self-report their gender. Ethics approval for the study was obtained. Based on the previous literature (Curran et al., 2015; Lalande et al., 2017); medium effect sizes (.15) were expected for the relations between need satisfaction, passion, life satisfaction and symptoms of activity dependence-related measures. Using G*Power software (Faul et al., 2009), we calculated that the sample size used in Study 1 was sufficient to detect medium-sized

effects with .95 power and $\alpha = .05$ (two-tailed) in our statistical models.

Measures

Need Satisfaction in Gaming. The (Ryan et al., 2006) was used to assess participants' need satisfaction in gaming. This scale comprises three 3-item subscales assessing the needs of autonomy (e.g., "My favorite game provides me with interesting options and choices"; $\alpha = .80$), competence (e.g., "I feel competent at my favorite game"; $\alpha = .76$), and relatedness (e.g., "I find the relationships I form with other players fulfilling, $a = .72$). Each item was rated on a 7-point Likert scale ranging from 1 ("do not agree at all") to 7 ("very strongly agree")¹. Consequently, all items from these three subscales were aggregated to form a single indicator of basic psychological need satisfaction ($\alpha = .81$).

Passion. Gamers' passion was assessed using the Passion Scale (Marsh et al., 2013) adapted to video games. Two 6-item subscales were used to assess harmonious passion (e.g., "Playing my favorite video game is in harmony with other activities in my life"; $\alpha = .79$) and obsessive passion (e.g., "I have difficulties controlling my urge to play my favorite video game", $\alpha = .87$).

Life Satisfaction. The 5-item Satisfaction With Life Scale (Diener et al., 1985) was used to measure one's level of satisfaction with life (e.g., "The conditions of my life are excellent"; $\alpha = .91$).

Symptoms of Addiction Toward Video Gaming. Symptoms of addiction toward gaming were assessed using the Problem Video Game Playing (PVP) scale (Tejreiro Salguero & Morán, 2002). This 9-item scale (e.g., "When I cannot play my favorite video game I get restless or irritable."; $\alpha = .91$) is adapted from the *DSM-IV* criteria for substance dependence and pathological gambling, applied to video gaming.

Data Analysis

Prior to analyses, all variables included in the subsequent path analyses were examined for accuracy of data entry, missing data, and fit between their distributions and the assumptions underlying maximum likelihood procedures (Tabachnick & Fidell, 2007). Descriptive statistics and bivariate correlation are reported in Table 1. All analyses in the present study were performed on a raw data file using robust maximum likelihood estimation (MLR) procedures with MPLUS 7.3 (Muthén & Muthén, 2012) because this method is robust to potential deviations in normality. Indirect effects were tested using the bias-corrected confidence intervals [CIs] using the maximum likelihood procedure (ML) because bootstrapping is unavailable using MLR estimation. The following fit indices were thus given priority in model evaluation: the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean squared residual (SRMR). According to Kline (2011) and Tabachnik and Fidell (2007), the CFI and TLI should be .95 or higher, while the RMSEA and SRMR should be .06 or lower for acceptable model fit.

The missing values in Study 1 (7.2%) appeared not to be missing at random (Little's MCAR χ^2 ($df = 13$) = 22.50, $p = .049$).

¹Unless otherwise indicated, all other instruments were completed using the same 7-point Likert scale.

Table 1
Descriptive Statistics and Bivariate Correlations—Study 1

Variables	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3	4
1. Contextual Need Satisfaction (Gaming)	377	4.95	1.21				
2. Harmonious Passion	377	4.14	1.25	.49***			
3. Obsessive Passion	377	2.52	1.39	.15**	.29***		
4. Symptoms of Gaming Addiction	325	2.69	1.40	.13*	.22***	.76***	
5. Life Satisfaction	299	4.07	1.48	.11	.11	-.05	-.06

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

Further inspection of the missing data showed that participants who did not respond to the life satisfaction scale reported lower levels of HP ($F[1, 376] = 4.44, p = .04$) while participants who did not complete the symptoms of behavioral addiction scale toward gaming reported lower levels of need satisfaction ($F[1, 375] = 3.91, p = .05$) compared to those who completed those scales. As recommended by Graham (2003); the full information maximum likelihood (FIML) procedure implemented within MPlus was used to handle missing data. FIML has been deemed as a very reliable way of handling missing data when compared to other methods such as listwise deletion or simple imputation (Enders, 2010).

Given the cross-sectional nature of the data in this study, we conducted additional path-analyses to confirm that our proposed models, which were based in the previous experimental and longitudinal findings of Lalonde et al. (2017), demonstrated the best fit to the data. These additional analyses, along with their corresponding figures and tables, can be found in the online supplemental material (OSM). Akaike's information criterion (AIC) and Bayesian information criterion (BIC) were used to compare models with lower values suggesting greater parsimony (Kline, 2011; Wagenmakers, 2007). Across both studies, the retained models presented in this article yielded the best fit indices.

Results

Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) was conducted in order to ensure that obsessive passion formed a distinct factor from behavioral addiction toward videogames given the high correlation of the two latent variables (Supplemental Figure 1; see OSM). Items from the obsessive passion and the symptoms addiction toward video gaming scales were used as indicators of the two latent variables. The results of an initial CFA revealed an unacceptable model fit: MLR $\chi^2 (df = 89, N = 377) = 249.84, p < .001$, CFI = .92, TLI = .91, RMSEA = .07 (.06, .08), SRMR = .05. Inspection of the modification indices provided by MPLUS suggested the addition of correlated residuals between four sets of items from the obsessive passion subscale (items 1 with 2; 3 with 4 and 6; and 5 with 6) as well as between five sets of items from the symptoms of addiction to video gaming subscale (items 1 with 2; items 3 with 4 and 9; 6 with 9; and 7 with 8). Allowing residuals to correlate indicates that measures are related to each other for reasons other than the latent variable of interest (for example, item wording; see Cole et al. 2007). In the current analysis, all correlated residuals occurred within each subscale, and were positively related. This revised two-factor model² yielded acceptable fit

indices: MLR $\chi^2 (df = 80, N = 377) = 147.34, p < .001$, CFI = .97, TLI = .96, RMSEA = .05 (.04, .06), SRMR = .04.

Path Analysis

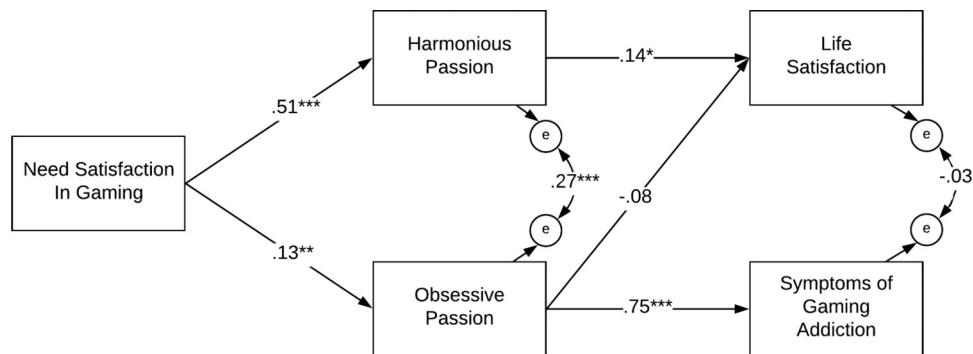
As shown in Figure 1, all predicted paths were statistically significant at the $p < .05$ level. Overall, the proposed model had an excellent fit to the data: MLR $\chi^2 (df = 3, N = 377) = 1.76, p = .62$, CFI = 1.00, TLI = 1.00, RMSEA = .00 (.00, .07), SRMR = .012. Results revealed that need satisfaction was positively related to both HP ($\beta = .51, p < .001, 95\% \text{ CI } [.43, .61]$), and OP ($\beta = .133, p = .003, 95\% \text{ CI } [.05, .26]$). In turn, HP was positively associated with life satisfaction ($\beta = .14, p = .04, 95\% \text{ CI } [.00, .33]$), while OP was related to symptoms of gaming addiction ($\beta = .75, p < .001, 95\% \text{ CI } [.65, .84]$). Results provided support for the indirect effect of HP in the relation between context specific need satisfaction and life satisfaction ($\beta = .07; 95\% \text{ CI } [.00, .14]$). Likewise, the indirect effect of OP in the relation between need satisfaction and symptoms of gaming addiction was also supported ($\beta = .10; 95\% \text{ CI } [.03, .17]$). Meanwhile there was no indirect effect from need satisfaction to life satisfaction through OP ($\beta = -.01; 95\% \text{ CI } [-.04, .00]$). The explained variance for symptoms of gaming addiction was $R^2 = .57$ and for life satisfaction was $R^2 = .02$.

Brief Discussion

Overall, the results of Study 1 supported our hypotheses. We found evidence in support of the distinct factor structure of obsessive passion and symptoms of video gaming addiction. In line with the findings reported in Lalonde et al. (2017), contextual need satisfaction during video gaming was related to both forms of passion. However, the type of passion gamers had appeared to matter for distinguishing the adaptive or maladaptive nature of its outcomes. For individuals with a HP, contextual need satisfaction in gaming was associated with higher levels of life satisfaction (through the indirect effects of HP). That is, when gaming was need satisfying and associated with a flexible and volitional engagement style (HP), video gaming appeared to contribute to a positive indicator of well-being. In contrast, for individuals with an OP, need satisfaction during video gaming was positively associated with symptoms of addiction toward gaming (through the indirect effects of OP). Thus, when video gaming was internalized in a controlled way, the satisfaction of needs during the activity was positively associated with a rigid and obsessive engagement (OP) which was associated with symptoms of behavioral addiction.

² We also tested a 1-factor model in response to reviewer requests, but the 2-factor model showed a superior fit to the data. Additional analyses and figures can be found in the OSM.

Figure 1
Path Analysis Describing the Relation Between Context Specific Need Satisfaction, Passion, Life Satisfaction, and Symptoms of Video Gaming Addiction in Study 1



Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Study 2

There were three purposes to Study 2. First, we sought to replicate the findings of Study 1 in a second domain: gambling. When gambling, individuals may come to experience freedom and choice with regards to their playing strategy (satisfying their need for autonomy), feelings of accomplishment when winning (satisfying their need for competence), and camaraderie with other gamblers at the casino (satisfying their need for relatedness). Based on the results of Study 1, we expected the need satisfaction experienced when gambling to give rise to two types of passion for gambling, HP and OP, which, in turn, would be associated with positive outcomes (life satisfaction) and negative outcomes (symptoms of behavioral addiction), depending on the type of passion.

Second, we sought to assess global need satisfaction in addition to contextual need satisfaction when gambling. While contextual need satisfaction was positively related to developing both types of passion (Study 1), we wanted to investigate whether need satisfaction experienced in daily life would relate differentially to the two types of passion. Building on the findings obtained in Lalonde et al. (2017), we hypothesized that lack of global need satisfaction would increase the likelihood that individuals would experience an OP for gambling. In turn, we expected lack of global need satisfaction to be positively related to symptoms of behavioral addiction through the indirect effects of OP.

Third, we sought to control for potentially confounding variables that have been related to behavioral addiction. Specifically, we sought to control for the number of hours spent gambling weekly to ensure the reported effects would not be attributable to the quantity but rather to the quality of the engagement with the activity (harmonious versus obsessive). Likewise we sought to control for the influence of relevant individual differences, to ensure our effects were not reducible to the influence of traits previously linked to behavioral dependence (Mehroof & Griffiths, 2010; Wang et al., 2015). For example, individuals who are neurotic (Mehroof et al., 2010), and are lower in conscientiousness (Wanget al., 2015) have been shown to be particularly vulnerable to Internet and gaming addiction.

As in Study 1, we hypothesized that need satisfaction within the context of gambling would be positively associated with both HP and OP, even when controlling for the number of hours spent gambling. Meanwhile we hypothesized that global need satisfaction

would be negatively related to OP, such that individuals greater need satisfaction in daily life would experience less OP for gambling. As in Study 1, we expected HP to be positively associated with life satisfaction and OP to be positively associated with symptoms of behavioral addiction toward gambling, even when controlling for relevant personality traits (for example, neuroticism, conscientiousness). Lastly, as in Study 1, we expected the constructs of OP and symptoms of behavioral addiction to be distinguishable.

Method

Participants and Procedure

Participants were recruited on online websites and forums dedicated to gamblers residing in the greater Montreal area of Quebec, Canada. Participants were informed that completing this study was voluntary and they would not receive incentive in exchange for their participation. The final sample comprised 397 gamblers with a mean age of 67.72 years ($SD_{age} = 8.60$ years). There were more males ($n = 273$) than females ($n = 120$) in the sample, while 4 participants did not provide their gender. The majority of the sample (59%) identified as French-Canadian, while 40% of respondents chose not to answer questions related to their ethnic/cultural identity. The type of gambling that participants reported engaging in was bingo (47.6%),³ followed by lottery-based games (24.4%) and

³ Although we did not have any a priori hypotheses about differences in the gamblers, following a reviewer's suggestion we conducted some exploratory analyses to compare bingo-players (B) to the other gamblers (OG) on the variables of interest. Bingo-players displayed higher need satisfaction in general life ($MB = 5.93$, $SDB = .98$) as compared to other gamblers ($MOG = 5.62$, $SDOG = 1.22$; $F[1, 370] = 7.21$, $p = .008$). They also appeared to hold more harmonious ($MB = 2.71$, $SDB = 1.36$) and less obsessive levels of passion ($MB = 1.95$, $SDB = 1.36$) as compared to levels of HP ($MOG = 2.29$, $SDOG = 1.33$) and OP ($MOG = 2.30$, $SDOG = 1.89$) in other gamblers ($FHP(1,362) = 8.62$, $p = .004$; $FOP(1,362) = 4.10$, $p = .044$). Finally, bingo players reported slightly higher levels of life satisfaction ($MB = 5.36$, $SDB = 1.26$; $MOG = 5.00$, $SDOG = 1.42$) and lower levels of gambling addiction ($MB = 1.94$, $SDB = 3.37$; $MOG = 3.74$, $SDOG = 6.84$) compared to the other gamblers ($FLIFESAT(1,369) = 6.52$, $p = .011$; $FADDICT(1,370) = 10.40$, $p < .001$). Importantly, despite some differences at the mean level, the general pattern of findings and main links stayed significant across both subsamples (i.e., irrespective of type of gambling).

casino-based games (21.1%). Ethics approval for the study was obtained. Based on the results of Study 1 and previous literature on the relations between need satisfaction, personality, weekly time spent in the activity, passion, life satisfaction and symptoms of activity dependence-related measures (Curran et al., 2015; Dalpé et al., 2019; Lalande et al., 2017); medium effect sizes (.15) were expected. As in Study 1, we used G*Power software (Faul et al., 2009) and calculated that the sample size of Study 2 was sufficient to detect medium-sized effect with .95 power and $\alpha = .05$ (two-tailed) in our statistical models.

Measures

Need satisfaction in gambling. The Player Experience of Need Satisfaction scale (Ryan et al., 2006) was adapted to the gambling context. This scale comprised three 3-item subscales assessing the needs of autonomy (for example, “Gambling provides me with interesting options and choices; $\alpha = .65$), competence (for example, “I feel competent when gambling”; $\alpha = .79$), and relatedness (for example, “I find the relationships I form with other players fulfilling, $\alpha = .87$). As in Study 1, all items from these three subscales were aggregated to form a single indicator of basic psychological need satisfaction in gambling ($\alpha = .90$).

Global Need Satisfaction. Participants’ satisfaction of basic psychological needs in their general life was assessed using a scale adapted from Deci and Ryan (2000). This scale comprises three 3-item subscales assessing the needs of autonomy (for example, “In general, I am provided with interesting options and choices; $\alpha = .75$), competence (for example, “I feel competent”; $\alpha = .84$), and relatedness (for example, “I find the relationships I form with others are fulfilling, $\alpha = .84$) using. Again, all items from these three subscales were aggregated to form a single indicator of need satisfaction in general ($\alpha = .92$).

Weekly Gambling. Participants were asked to report the number of hours they spent gambling on a weekly basis.

Neuroticism and Conscientiousness. Participants’ traits of neuroticism and conscientiousness were assessed using the two 6-item subscales from the Revised NEO Five-Factor Inventory (NEO-FFI; Costa & MacCrae, 1992). Both the neuroticism (for example, “When I am under a great deal of stress, sometimes I feel like I’m going to pieces”; $\alpha = .58$) and conscientiousness (for example, “I’m pretty good about pacing myself so as to get things done on time”; $\alpha = .74$) subscales showed adequate reliability.

Passion. Gamblers’ passion was assessed using the Passion Scale (Rousseau et al., 2002) adapted to gambling. Two 5-item subscales were used to assess harmonious (for example, “Gambling is in harmony with other activities in my life”; $\alpha = .85$) and obsessive (for example, “I have difficulties controlling my urge to gamble; $\alpha = .94$) passion.

Life Satisfaction. The 5-item Satisfaction With Life Scale (Diener et al., 1985) was used to measure life satisfaction ($\alpha = .91$).

Symptoms of Gambling Addiction. Symptoms of addiction toward gambling were assessed using the 12-item Canadian Problem Gambling Index (CGPI; Ferris & Wynne, 2001; for example, “Have you felt that you might have a problem with gambling?”; $\alpha = .96$) on a 0 (never) to 3 (always) Likert scale. Scores on the CGPI correlate highly with measures of dependence derived from the DSM-IV (Ferris & Wynne, 2001) and with other measures of

gambling dependence such as the South Oaks Gambling Screen (Ladouceuret al., 2000).

Data Analysis

Similar to Study 1, all variables included in the subsequent path analyses were examined for accuracy of data entry, missing data, and fit between their distributions and the assumptions underlying maximum likelihood procedures (Tabachnick & Fidell, 2007). Descriptive statistics and bivariate correlation are reported in Table 2. The missing values in Study 2 (4.8%) appeared to not be missing at random (Little’s MCAR $\chi^2 [df = 70] = 128.76, p < .001$). Further inspection of the missing data showed that participants who did not answer to the hours of weekly involvement in gambling reported lower levels of context-specific need satisfaction ($F[1, 392] = 25.20, p < .001$), HP ($F[1, 381] = 45.34, p < .001$), and OP ($F[1, 382] = 10.20, p = .002$) compared to those who answered this question. As in Study 1, the FIML procedure implemented within MPlus was used to handle missing data.

Results

Confirmatory Factor Analysis

As in Study 1, a confirmatory factor analysis (CFA) was conducted in order to ensure that obsessive passion formed a distinct factor from behavioral addiction toward gambling (Supplemental Figure 2; see OSM). Results of this factor analysis showed support for a 2-factor model⁴, thus demonstrating the factorial independence of the two scales: $\chi^2 (df = 118, N = 397) = 224.89, p < .001$, CFI = .96, TLI = .95, RMSEA = .05 (.04, .06), SRMR = .04.

Path Analysis

Overall, the proposed model had an excellent fit to the data: MLR $\chi^2 (df = 10, N = 397) = 13.77, p = .18$, CFI = .99, TLI = .99, RMSEA = .031 (.00, .07), SRMR = .03. As shown in Figure 2, all predicted paths were statistically significant at the $p < .05$ level. Results revealed that contextual need satisfaction (that is, while gambling) was positively related to both HP ($\beta = .49, p < .001$, 95% CI [.38, .59]), and OP ($\beta = .16, p = .001$, 95% CI [.07, .26]). Global need satisfaction was negatively associated with OP ($\beta = -.22, p < .001$, 95% CI [-.32, -.13]) and positively associated with life satisfaction ($\beta = .60, p < .001$, 95% CI [.50, .68]). In turn, HP and OP were associated with life satisfaction in opposite directions, with HP being positively and OP being negatively related to life satisfaction ($\beta = .12, p = .002$, 95% CI [.04, .19]); $\beta = -.17, p = .001$, 95% CI [-.28, -.08]). Finally, OP related positively to symptoms of gambling addiction ($\beta = .53, p < .001$, 95% CI [.41, .63]).

These associations were obtained while controlling for the number of hours spent gambling, individuals’ conscientiousness and neuroticism. Number of hours spent gambling weekly was positively related to HP ($\beta = .15, p = .008$, 95% CI [.04, .26]), OP ($\beta = .23, p < .001$, 95% CI [.11, .33]), and symptoms of gambling addiction ($\beta = .11, p = .035$, 95% CI [.00, .23]). Neuroticism was

⁴ We also tested a 1-factor model in response to reviewer requests, but the 2-factor model showed a superior fit to the data. Additional analyses can be found in the OSM.

Table 2
Descriptive Statistics and Bivariate Correlations—Study 2

Variables	N	M	SD	1	2	3	4	5	6	7	8
1. Contextual need satisfaction (Gambling)	393	2.11	1.22								
2. Global need satisfaction (life outside of Gambling)	393	5.78	1.10	.03							
3. Harmonious passion	383	2.45	1.36	.52***	-.10						
4. Obsessive passion	384	2.08	1.63	.19***	-.34***	.45***					
5. Symptoms of gambling addiction	397	2.79	5.46	.08	-.36**	.26**	.68***				
6. Life satisfaction	392	5.18	1.35	.06	.69***	-.03	-.38***	-.45***			
7. Gambling hours per week	268	8.27	8.81	.22***	-.07	.22***	.27***	.26***	-.06		
8. Neuroticism	395	2.58	0.69	-.04	-.28***	.09	.38***	.45***	-.36***	.05	
9. Conscientiousness	395	4.50	0.74	.00	.49***	-.05	-.21***	-.25***	.33***	-.05	-.07

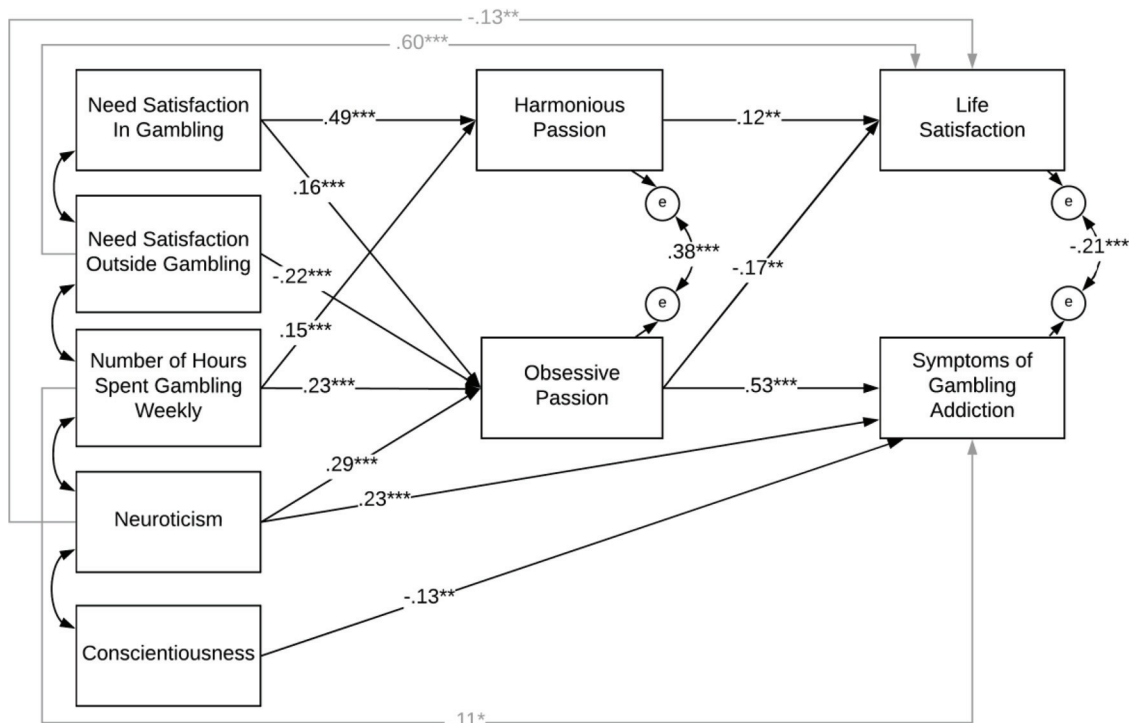
p < .05. ** *p* < .01. *** *p* < .001.

positively associated with OP ($\beta = .29, p < .001, 95\% \text{ CI } [.20, .38]$), and symptoms of gambling addiction ($\beta = .23, p < .001, 95\% \text{ CI } [.15, .30]$), while it was negatively related to life satisfaction ($\beta = -.13, p < .001, 95\% \text{ CI } [-.21, -.06]$). Conscientiousness was negatively associated with symptoms of gambling addiction ($\beta = -.13, p < .001, 95\% \text{ CI } [-.20, -.06]$).

As with Study 1, our results first provided support for the indirect effects of both types of passion in the relation between need satisfaction in gaming and life satisfaction (see Table 3). Of interest, results showed that contextual need satisfaction was differentially related to life satisfaction as a function of the type of passion. Specifically, the indirect effect of contextual need

satisfaction on life satisfaction was positive through HP ($\beta = .06; 95\% \text{ CI } [.02, .10], p = .004$). In contrast, contextual need satisfaction was indirectly and negatively related to life satisfaction through OP ($\beta = -.03; 95\% \text{ CI } [-.06, -.01], p = .011$). Moreover, contextual need satisfaction was indirectly related to symptoms of gambling addiction through OP ($\beta = .09; 95\% \text{ CI } [.04, .14], p = .001$). With regards to global need satisfaction, results supported the indirect effects of OP in its relation with symptoms of gambling addiction ($\beta = -.12; 95\% \text{ CI } [-.19, -.06], p < .001$). See Table 3 for all the remaining indirect effects. The explained variance for symptoms of gambling addictions was $R^2 = .51$ and for life satisfaction was $R^2 = .53$.

Figure 2
Path Analysis Describing the Relation Between Context Specific and Global Need Satisfaction, Hours Spent Gambling, Neuroticism, Conscientiousness, Passion, Life Satisfaction, and Symptoms of Gambling Addiction in Study 2



Note. * *p* < .05. ** *p* < .01. *** *p* < .001.

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Table 3

Indirect Effects of Contextual Need Satisfaction While Gambling on Life Satisfaction and Symptoms of Gambling Addiction Through Harmonious and Obsessive Passion—Study 2

	Contextual need satisfaction (gambling) → outcome			95% CI	
	Mediating variables	Indirect effect	<i>p</i>	Lower	Upper
Life satisfaction	Harmonious Passion	.06	.00	.02	.10
	Obsessive Passion	−.03	.01	−.06	−.01
Symptoms of Addiction	Obsessive Passion	.09	.00	.04	.14
Global Need Satisfaction → Outcome					
Symptoms of Addiction	Obsessive Passion	−.12	.00	−.19	−.06
Hours of Weekly Involvement in Gambling → Outcome					
Life satisfaction	Harmonious Passion	.02	.05	.00	.04
	Obsessive Passion	−.04	.01	−.07	−.02
Symptoms of Addiction	Obsessive Passion	.12	.00	.06	.19
Neuroticism → Outcome					
Symptoms of Addiction	Obsessive Passion	.16	.00	.10	.21

Brief Discussion

The results of Study 2 replicated the findings of Study 1 with a different activity (gambling) and with an older sample. In addition, the results of Study 2 supported our hypotheses after controlling for relevant personality traits (e.g., conscientiousness, neuroticism) and quantity of engagement with the activity (e.g., hours gambling per week). Importantly, we found that the two sources of need satisfaction (context specific and global) played different roles for the two types of passion. Within the context of the passionate activity, need satisfaction was positively associated with both types of passion although a stronger effect was observed for HP when compared to OP, which is consistent with Study 1 and the four studies reported in Lalande et al. (2017). Moreover, only HP was positively associated with increased life satisfaction.

Global need satisfaction appeared to play a uniquely important role for OP. We found that individuals who reported low global need satisfaction were more likely to experience high levels of OP and symptoms of gambling addiction, despite experiencing need satisfaction within the context of gambling. Said differently, those individuals with low global need satisfaction were more likely to experience an OP and greater symptoms of gambling addiction. One interpretation of this finding is that when need satisfaction within an activity (e.g., gambling) is expected to make up for low global need satisfaction, people may end up clinging to the activity more tightly. Consequently, they may lose control over the activity (experience OP) and develop symptoms behavioral addiction. Global need satisfaction was unrelated to HP for the activity, providing additional support to the findings of Lalande et al. (2017).

General Discussion

The purpose of the present research was to examine the role of need satisfaction and passion in two activities commonly associated with symptoms of behavioral addiction: video gaming and gambling. It was hypothesized that need satisfaction during the activity would be positively associated with developing both types of passion. However, it was hypothesized that low global need satisfaction would be uniquely associated with developing an OP. While HP was hypothesized to

contribute to life satisfaction, OP was hypothesized to be positively associated with symptoms of behavioral addiction.

Across two studies examining different forms of behavioral addiction (video gaming and gambling) in different age groups, we found consistent evidence for these hypotheses. Context-specific need satisfaction was positively related to both harmonious and obsessive passion. While HP for the activity was positively associated with increased life satisfaction in both studies, OP was consistently associated with greater symptoms of behavioral addiction toward the activity. Importantly, in Study 2 we obtained evidence suggesting that OP may represent a compensatory response to unsatisfied psychological needs outside the purview of the passionate activity. Symptoms of behavioral addiction appeared to develop when contextual activity-based need satisfaction was high, but global need satisfaction was low. While popular media reports often vilify video gaming and gambling as inherently problematic activities (Knutson, 2019), the current findings contextualize the media hype about problematic video gaming and gambling by suggesting that the combination of high activity-specific need satisfaction with low need satisfaction in general life puts individuals most at risk for developing a behavioral addiction through the indirect effects of OP. Players whose gaming or gambling is associated with need satisfaction through a HP seem to benefit from engaging in these activities, at least in terms of their life satisfaction. In contrast, when needs are satisfied within the context of the activity but are integrated in a controlled fashion (OP), the activity is associated with higher levels of symptoms of behavioral addiction (Studies 1 and 2) and lower levels of life satisfaction (Study 2).

This research contributes to the literature on the DMP (Vallerand, 2015) by demonstrating that both forms of passion can arise from need satisfaction, but that the two forms of passion have distinct outcomes with regards to symptoms of behavioral addiction. Indeed, our findings demonstrated that need satisfaction within the activity was positively related to both forms of passion. However, when taking a broader view of the person's experiences and examining need satisfaction outside of the activity (Study 2), global need satisfaction was negatively associated with OP, protecting individuals from becoming obsessively passionate about the activity. Indeed, the risk for maladaptive symptoms of behavioral addiction for an activity

appears to be heightened in circumstances where the activity is the only source of need satisfaction in a person's life. This finding complements Vallerand's hierarchical model of motivation (1997) which underscores the importance of taking a holistic view of a person's motivation and need satisfaction at different levels of specificity in order to more fully understand what is experienced within the context of a given activity.

Our studies also contribute to the behavioral addiction literature by identifying unbalanced needs and OP as a possible motivational antecedent to symptoms of behavioral addiction. The combination of both contextual and global need satisfaction seems to matter for the development of symptoms of behavioral addiction: without context-specific need satisfaction the person would not come to value the activity and develop a passion for it and without a deficit in global need satisfaction the person would not develop an OP. While unbalanced needs and OP have both been separately linked to behavioral addiction, this is the first study to consider both contextual and global need satisfaction as well as the two forms of passion predicting life satisfaction and symptoms of behavioral addiction. Moreover, while most studies have considered models of need satisfaction and behavioral addiction in the context of Internet gaming (Allen et al., 2018) and videogames (Lafrenière et al., 2009) we extended these findings to the gambling context, which is a widely studied form of behavioral addiction. Thus, our findings allow researchers and clinicians to (1) integrate findings on behavioral addiction obtained through the complementary theoretical frameworks of the Dualistic model of Passion (Vallerand, 2015) and Self-Determination Theory (Ryan & Deci, 2017); (2) construct a comprehensive motivational model of behavioral addiction that considers basic psychological needs at the level of the activity and in people's lives generally, (3) generalize findings beyond the domain of Internet gaming and video games, and (4) inform Self-Determination Theory-based interventions for behavior change (Ryan & Deci, 2017). Indeed, this research suggests that interventions designed to support and enhance the basic psychological needs for competence, autonomy, and relatedness in everyday life can potentially inoculate recreational gamers and gamblers from developing obsessive passions and symptoms of behavioral addiction.

Future research is needed to further clarify the role that global need satisfaction can play in the prevention of pathological gambling, video gaming and other forms of behavioral addiction. Indeed, while the present research extended work on psychological need satisfaction to the gambling context, it would be important for future studies to examine other forms of symptoms of behavioral addiction that lack the "gamification" aspect of gaming and gambling, such as compulsive buying and kleptomania. Future research would also benefit from exploring whether the present findings can be applied to socially desirable or generally positive contexts. Preliminary research suggests that individuals can become obsessively passionate about benevolent causes, such as providing disaster relief and medical care during humanitarian missions (St-Louis et al., 2016); and that, with OP, engagement in these endeavors comes at a cost. For example, St-Louis et al. (2016) found that OP for a humanitarian cause led to increased physical injuries related to the individuals' involvement in the cause, as well as increases in physical symptoms and incidence of posttraumatic stress disorder following the humanitarian mission. Similarly, Carbonneau et al. (2010) found that the practice of

Yoga, which is widely regarded to be generally relaxing and beneficial for health, was associated with increased negative affect when the urge to practice stemmed from an OP. As such, even when the context of the OP aligns with intrinsic values, such as self-care and community engagement, numerous studies highlight the danger of the rigid persistence associated with OP across contexts, which can undermine mental and physical health (Carbonneau et al., 2010; Lafrenière et al., 2009; Rip et al., 2012; Stephan et al., 2009; St-Louis et al., 2016).

The present studies were not without limitations. First, a major limitation of the present research is that the populations sampled were not selected on the basis of "clinical impairment" or problematic symptoms of addiction—indeed the majority of both samples did not report concerning levels of addiction symptoms. Surveying clinical populations is an important next step for the generalizability of these findings. While our samples were diverse in age, and in their passionate activity (videogames and gambling), the samples were not diverse in terms of ethnicity, which also limits the generalizability of the reported effects. Another important limitation is that our data was cross-sectional. Experimental, longitudinal, and experience sampling methods would supplement the correlational nature of the present findings and speak to the causality of the reported associations. Past research on the effects of needs and passion on life satisfaction generally have higher effect sizes than the ones we report here (see Lalonde et al., 2017); thus, perhaps our effects are underestimated in the present models but not overestimated. In addition, future research would benefit from also assessing need frustration within and outside of the activity, since need frustration in the real world may make individuals more susceptible to developing an obsessive passion (Mills et al., 2020), beyond the effects of need deprivation reported here.

In sum, the present is the first research to test the role of need satisfaction and passion in symptoms of behavioral addiction in two domains. The present findings reveal that experiences of need satisfaction within an activity are associated with the development of both HP and OP, but that a lack of need satisfaction in general life makes individuals more susceptible to developing an OP. OP is in turn associated with the development of symptoms of behavioral addiction. Future research on needs experiences and OP may be a promising avenue to ultimately prevent and treat symptoms of behavioral addiction.

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