Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

THE GAMBLING CRAVING EXPERIENCE QUESTIONNAIRE: PSYCHOMETRIC PROPERTIES OF A NEW SCALE BASED ON THE ELABORATED INTRUSION THEORY OF DESIRE

Aurélien Cornil[a], Jiang Long[a,b], Stéphane Rothen[c], José C. Perales[d], Philippe de Timary[e,h], Joël Billieux[a,f,g]

[a] *Psychological Sciences Research Institute, Université catholique de Louvain, Louvain-Ia-Neuve, Belgium*

[b] *Mental Health Institute of the Second Xiangya Hospital, Central South University, Changsha, China*

[c] *Addictology Division, Department of Mental Health and Psychiatry, Geneva University Hospitals, Geneva, Switzerland*

[d] *Mind, Brain, and Behavior Research Center (CIMCYC); Department of Experimental Psychology; University of Granada, Spain*

[e] *Department of Adult Psychiatry, Academic Hospital Saint Luc, Louvain la Neuve, Belgium*

[f] *Addictive and Compulsive Behaviours Lab, Institute for Health and Behaviour, University of Luxembourg, Luxembourg*

[g] *Centre for Excessive Gambling, Lausanne University Hospitals (CHUV), Switzerland*

[h] *Institute of Neuroscience, Université catholique de Louvain, Louvain la Neuve, Belgium*

KEYWORDS : Craving, Urge, Gambling, Elaborated intrusion theory of desire, Measure, Assessment

HIGHLIGHTS :

- The g-CEQ is grounded on the elaborated intrusion theory of desire.
- The g-CEQ has two forms to measure gambling craving frequency (1) and strength (2).
- Each form has nine items and three subscales: intensity, imagery, and intrusiveness.
- Analyses reveal good psychometric properties of the g-CEQ.
- The g-CEQ can be used to measure gambling craving in clinical and research contexts.

ABSTRACT

Both research and clinical practice acknowledge the importance of craving as a maintenance and relapse factor in gambling disorder. The elaborated intrusion theory (EIT; Kavanagh et al., 2005) of desire has been extensively investigated in relation to psychoactive substance or food cravings but, to date, has scarcely been studied in relation to gambling. In such a context, developing an assessment tool of gambling craving based on the EIT is warranted. To fill this gap in the literature, we aimed to develop and test the psychometric properties of a gambling-adapted version of the Craving Experience Questionnaire (CEQ; May et al., 2014), which is the best-established measure of craving theoretically anchored in the EIT. An online survey that included the gambling CEQ (g-CEQ) and a craving induction procedure was administered to 274 community participants involved in gambling at least a few times a year. Concurrent and convergent validity were explored through correlations with a scale that measured gambling urge and with a series of questionnaires that measured disordered gambling symptoms, gambling cognitions, and gambling motives. The confirmatory factor analyses supported the validity of the expected three-factor model of the "strength" and "frequency" forms of the g-CEQ and showed better model fit than a one-factor solution, corroborating the initial structure of the CEQ. Furthermore, the scale has good internal consistency and its validity is supported by correlations with gambling-related constructs. The g-CEQ is thus a theoretically and psychometrically sound instrument to measure gambling craving based on the EIT.

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

1. Introduction

Gambling disorder is a mental condition associated with severe personal and public consequences (Blaszczynski & Nower, 2002; Lorains, Cowlishaw, & Thomas, 2011). Its prevalence is estimated at 1.5% in the worldwide adult population (Gowing et al., 2015; Williams, West, & Simpson, 2012), but it ranges from 0.2% in Norway to 5.3% in Hong Kong, highlighting important national differences (Hodgins, Stea, & Grant, 2011). Gambling disorder was aligned with substance use disorders in the last version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013) and in the recently released eleventh *International Classification of Diseases* (World Health Organization, 2018). This new classification (the condition was previously conceptualized as an impulse control disorder) was supported by a large body of evidence that highlighted important similarities between substance use and gambling disorder (e.g., Clark, 2010; Goudriaan, Oosterlaan, De Beurs, & Van Den Brink, 2006; Potenza, 2006). Nevertheless, although craving is now a recognized diagnostic criterion for substance use disorder in the DSM-5, it has not been retained to define gambling disorder (American Psychiatric Association, 2013). In such a context, further research on the phenomenology, etiology, and assessment of gambling craving is warranted.

Gambling craving (and related constructs such as urge, drive, temptation, and desire; Young, Wohl, Matheson, Baumann, & Anisman, 2008) has been increasingly investigated over the past 20 years, and influential models in the field, as well as research, have considered craving to play a pivotal role in the development, maintenance and relapse of gambling disorder (Hodgins & el-Guebaly, 2004; Oei & Gordon, 2007; Sharpe, 2002; Smith et al., 2013). Research also showed that gambling-like reinforcement schedules seem to trigger the same incentive-sensitization mechanisms that underlie craving in substance use disorders (Anselme, Robinson, & Berridge, 2013; Rømer Thomsen, Fjorback, Møller, & Lou, 2014). Moreover, neurobiological evidence has been gathered that shows clear similarities between cravings for psychoactive substances and for gambling (van Holst, van den Brink, Veltman, & Goudriaan, 2010). Initial studies that relied on questionnaires adapted from the substance use field showed, somewhat surprisingly, that pathological gamblers tend to report stronger craving than cocaine addicts or alcoholics do (Castellani & Rugle, 1995; de Castro, Fong, Rosenthal, & Tavares, 2007; Tavares, Zilberman, Hodgins, & el-Guebaly, 2005), highlighting the relevance of craving as a significant symptom not only for substance use disorder but also for gambling disorder.

According to Ashrafioun and Rosenberg (2012), gambling craving has mainly been measured through visual analog scales with one single item (e.g., rating current gambling craving on a scale from 1 = "no urge" to 10 = "extreme urge"; Sodano & Wulfert, 2010). Although convenient for quick and repeated measurement, this method fails to capture the complexity and multifactorial nature of the gambling craving experience (Navas, Billieux, Verdejo-Garcia, & Perales, 2019; Young & Wohl, 2009). Several authors have developed multi-item unidimensional questionnaires such as the Gambling Urge Scale (Raylu & Oei, 2004b) or the Penn Gambling Craving Scale (Tavares et al., 2005). Furthermore, questionnaires with subscales were also developed: the Pathological Gambling Yale-

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

Brown Obsessive-Compulsive Scale (measuring thoughts/urges and compulsions separately; Pallanti, DeCaria, Grant, Urpe, & Hollander, 2005) or the Gambling Craving Scale (measuring gambling urges related to positive and negative reinforcement; Canale, Cornil, Giroux, Bouchard, & Billieux, 2019; Young & Wohl, 2009). These questionnaires were based on traditional motivational and reinforcement-based (reward versus punishment sensitivity) models of craving (for conceptual comparisons of these models, see Canale et al., 2019; May, Andrade, Panabokke, & Kavanagh, 2004; Skinner & Aubin, 2010). More recently, a cognitive model emerged that paved the way for new fundamental and clinical research: the elaborated intrusion theory of desire (EIT; Kavanagh, Andrade, & May, 2005; May, Kavanagh, & Andrade, 2015). The EIT defines craving (or desire) as an emotionally laden subjective state in which attention remains focused on the object of the desire. According to the EIT, and in line with previous influential models of craving, the craving experience initially results from confrontation with specific internal and external cues that triggers intrusive desire thoughts (verbal or imaginal) related to the object of craving. In a second step, which constitutes the more central and original feature of the EIT, cognitive elaboration of these intrusive thoughts is induced through a double vicious spiral process. First, the desire-related thoughts generate pleasure and relief as the object of craving is reached through imagery (Weber et al., 2017). This positive reinforcement is postulated to contribute to the perpetuation of the elaborated desire-related thoughts. Second, the consciousness of a discrepancy between the desired imagery and reality (i.e., the craving is not actually fulfilled) elicits a sense of associated deficit that fosters elaboration of desire thoughts in order to cope with this perceived deficit- and relief-associated negative affect. The inner tension for the desired object that results from this cognitive elaboration represents the subjective state of craving.

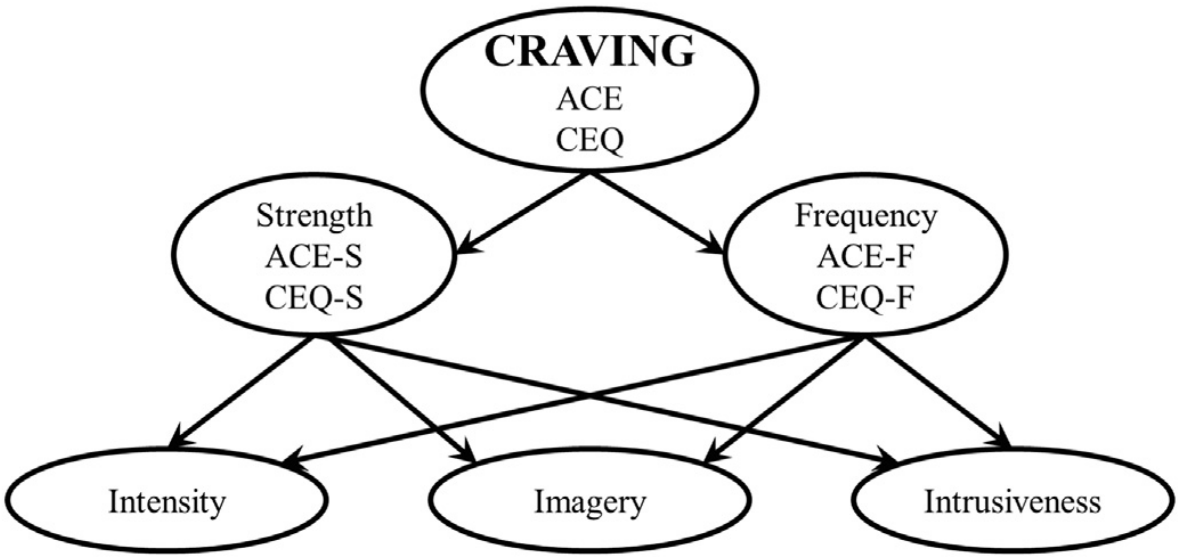
To assess the subjective state of craving (or desire) as conceptualized by the EIT, investigators developed two scales. The first is the Alcohol Craving Experience questionnaire (ACE; Coates et al., 2017; Statham et al., 2011). The ACE consists of two forms: one assessing the strength of craving episodes (ACE-S) and the other assessing the frequency of craving episodes over a specific time frame (ACE-F). Each form is composed of three distinct subscales (examples provided are related to the strength and frequency forms, respectively): (1) intensity (e.g., "How strongly did you want a drink?" and "How often did you want a drink?"), imagery (e.g., "How vividly did you picture alcohol or drinking?" and "How often did you picture alcohol or drinking?"), and intrusiveness (e.g., "How intrusive were the thoughts?" and "How often were the thoughts intrusive?"). Also grounded on the EIT, the Craving Experience Questionnaire (CEQ; May et al., 2014) is an adapted version of the ACE designed to assess cravings for psychoactive substances (e.g., alcohol, cigarettes) and food. The EIT was validated in a heterogeneous sample of participants (e.g., patients with substance use disorders; community participants deprived of food) through a combination of exploratory factor analysis and confirmatory factor analysis (CFA) that highlighted a similar structure for the ACE and the CEQ (see Fig. 1). This factor structure was initially found for the ACE (only one item of the ACE, referring to body feelings, was not adapted to all substances and was removed from the scale).

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

1.1. CURRENT STUDY

To date, no instrument grounded in the EIT exists to measure gambling craving. Yet, a previous study by Cornil et al. (2018) supported the validity of the EIT to account for gambling craving, showing through a mixed-method and phenomenological approach that this very theory might constitute a promising theoretical framework for gambling research. In such a context, developing an assessment tool for gambling craving based on the EIT is warranted for both research and clinical purposes. To fill this gap in the literature, we aimed in the present study to develop and test the psychometric properties of a gambling-adapted version of the CEQ (i.e., the g-CEQ) that measures the strength of a specific craving, as well as the frequency of cravings over a time frame. To this end, community gamblers were recruited and completed an online experiment. Our study capitalized on an induction procedure (audio-guided imagery session), as some items of the g-CEQ assess state constructs (craving states are fluctuant and triggered by specific cues). Concurrent and convergent validities were established by considering relations with (1) a gambling urge scale, (2) gambling and problem gambling-related factors (i.e., gambling cognitions, gambling motives, and problem gambling symptoms), and (3) psychological dimensions known to affect craving experiences (affective states and impulsivity traits).

Figure 1. *Structure of the Alcohol Craving Experience questionnaire (ACE) and the Craving Experience Questionnaire (CEQ).*



Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

2. Materials and methods

2.1. PARTICIPANTS

Recreational gamblers were recruited from the general community through online advertisements on research-related Facebook groups and websites. Participants had to be at least 18 years old, fluent French speakers, and involved in gambling at least a few times a year. Participants were informed, prior to their inclusion, that the study focused on the desire to gamble. A total of 401 participants answered the online questionnaire. Among them, 290 (72.32%) completed the entire questionnaire. Sixteen respondents were removed because of an exaggeratedly speedy completion time (< 10 min), or because of age (> 90 years old), duplicate answers (determined by cross-examination of IP addresses, age, sex and emails), or contradictory answers to a scale with a reversed item (participants who systematically responded with the lowest score on all items of the scale, including a reversed item, were excluded). The final sample was composed of 274 participants (152 women) with an age range of 18 to 74 years (M = 28.54, SD = 11.10). Nationality, mother tongue, level of education, and gambling frequency are reported in Table 1, and gambling frequency and preferences are presented in Table 2. According to the cut-off generally used with the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001), our sample of gamblers included *non-problem* (28.83%), *low-risk* (31.38%), *moderate-risk* (29.20%), and *problem* (10.58%) gamblers.

Table 1. *Sample description*

	Sample % (n = 274)
Nationality	
Belgian	28.83%
French	67.15%
Other[a]	4.01%
Mother tongue	
French	95.62%
Other[b]	4.38%
Education	
Primary	0.73%
Secondary	20.44%
Diploma of Collegial Studies (Canada)	0.73%
Bachelor	49.27%
Master	24.45%
Ph.D.	2.19%
Other	2.19%
Gambling frequency	
At least a few times a year	42.70%
At least once a month	20.07%
At least a few times a month	14.23%
Once a week	9.12%
A few times a week	13.14%
Every day	0.73%

[a] Participants reporting another nationality were Algerian, Burundian, Congolese, Hungarian, Iranian, Moroccan, Polish, or Spanish.
[b] Participants reporting another mother tongue were all fluent French speakers.

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

Table 2. *Gambling habits.*

	Gambling frequency %	Favorite gambling %
Scratch cards	72.99%	36.86%
Lottery	53.65%	18.61%
Betting (online)	28.10%	15.69%
Slot machines	23.36%	6.57%
Poker (offline)	20.80%	7.30%
Betting (offline)	17.15%	5.84%
Poker (online)	16.48%	4.38%
Stock exchange	5.47%	1.46%
Other	3.28%	3.28%

Note. The gambling activities are sorted according to gambling frequency.

2.2. MEASURES AND PROCEDURE

The g-CEQ is a gambling-adapted version of the CEQ (May et al., 2014). The scale was created by having the CEQ items translated from English into French and then having another bilingual translator back-translate them into English, as required when adapting scales previously published in another language. When necessary, wording was adapted to the gambling context. The items pertaining to the imagery subscales of each form (i.e., strength and frequency) were also modified: the four items covering picture, smell, taste, and mouth imagery in the CEQ were adapted into three items covering picture, auditory, and tactile imagery in the g-CEQ. These modalities are indeed better adapted for gambling according to a previous study that explored the phenomenology of the gambling craving experience (Cornil et al., 2018). The final scale consisted of 18 items (nine for each form) rated on a scale ranging from 0 ("not at all") to 10 ("extremely" for CEQ-S and "constantly" for CEQ-F). All items are reported (in French and in English) in the Appendix.

The study sequence is depicted in Fig. 2 and the questionnaires that were administered online are described in Table 3. After having signed informed consent, participants completed demographic information. The Positive and Negative Affect Schedule (PANAS; Gaudreau, Sanchez, & Blondin, 2006) was then administered to control affective state prior to the beginning of the study. Participants then filled in a series of items that assessed gambling habits and completed the PGSI (Ferris & Wynne, 2001) and the gambling Craving Experience Questionnaire - Frequency (g-CEQ-F) which evaluated the occurrence of gambling cravings over the past week. Afterwards, an induction procedure was administered to participants through an audio-guided imagery scenario that was based on an experimental procedure (Ashrafioun, Kostek, & Ziegelmeyer, 2013) and adapted into French. Participants were asked to imagine themselves discussing wins and positive aspects of different gambling types (bets, lottery tickets, and several casino games) with their friends. They were then instructed to picture themselves practicing their favorite gambling activity. This procedure showed efficacy in another sample (Canale et al., 2019; Sample 1). Following the craving induction, participants were assessed with the gambling Craving Experience Questionnaire - Strength (g-CEQ-S) for current gambling craving and with another scale assessing current gambling

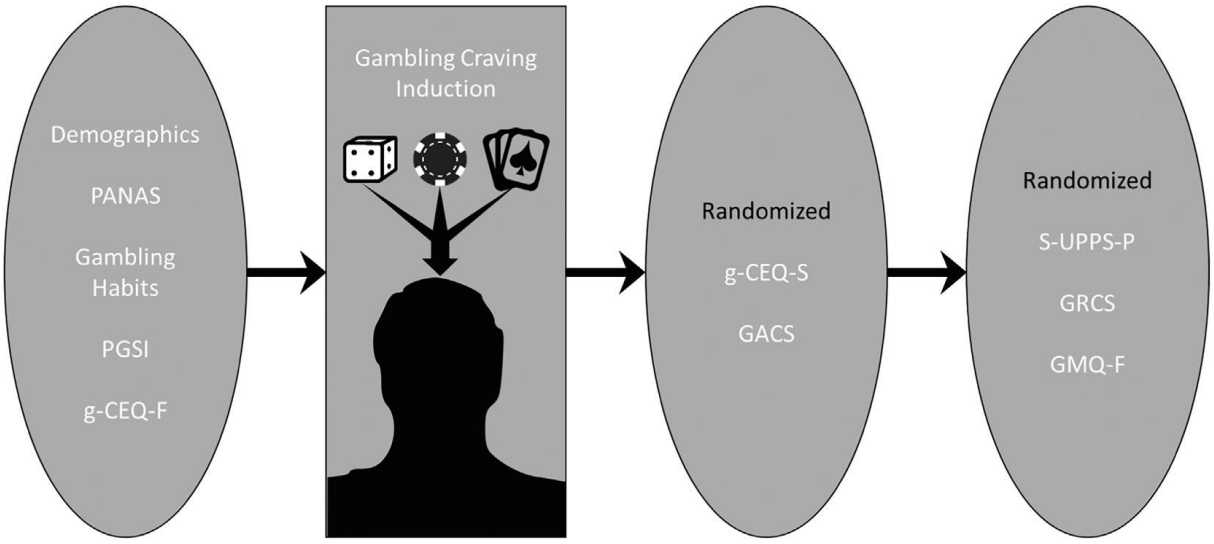
Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

urge: the Gambling Craving Scale (GACS; Young & Wohl, 2009; French version: Canale et al., 2019). The GACS, which measures gambling urge as a state, was included to assess concurrent validity. To evaluate convergent validity, we randomized three questionnaires that measure gambling-related constructs and administered them to assess impulsivity traits (short UPPS-P Impulsive Behavior Scale; S-UPPS-P; Billieux et al., 2012), gambling motives (Gambling Motives Questionnaire - Financial; GMQ-F; Schellenberg, McGrath, & Dechant, 2016; French version: Devos et al., 2017), and gambling cognitions (Gambling Related Cognitions Questionnaire; GRCS; Raylu & Oei, 2004a; French version: Grall-Bronnec et al., 2012). Finally, a short audio-guided mindfulness session was systematically offered to participants to avoid any experiment-related carryover effect.

Participants who entirely completed the survey were invited to provide an email address if they were interested in receiving compensation (5 euros; 54.71% of the sample requested the compensation). Participants' bank details or PayPal account were requested by mail to perform the transfer. There were no differences between participants accepting the compensation or not in terms of demographics (age, gender), gambling frequency, or problem gambling symptoms.

The study protocol was approved by the ethical committee of the psychological Sciences Research Institute (IPSY) at the Université catholique de Louvain (Louvain-la-Neuve, Belgium). Some of the data set described here is part of Sample 2 in the study by Canale et al. (2019).

Figure 2. *Study design.*



g-CEQ-S = gambling Craving Experience Questionnaire - Strength form; g-CEQ-F = gambling Craving Experience Questionnaire - Frequency form; GACS = Gambling Craving Scale; PGSI = Problem Gambling Severity Index; GMQ-F = Gambling Motives Questionnaire; GRCS = Gambling-Related Cognitions Scale; S-UPPS-P = short UPPS-P Impulsive Behavior Scale.

All 274 participants completed each questionnaire of the survey.

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

2.3. DATA ANALYTIC STRATEGY

Preliminary analysis of the distribution of variables with a graphical approach and skewness and kurtosis tests indicated that most of the data were not normally distributed and were right-skewed. Consequently, non-parametric tests were preferred. As the factor structure of the CEQ had already been established (May et al., 2014), each form (i.e., g-CEQ-S and g-CEQ-F) was investigated through a CFA by using maximum likelihood with the Satorra-Bentler correction (MLM) as estimator. This robust version of the maximum likelihood estimator is recommended for smaller samples and non-normal data with outliers, and it requires no missing values (Schumacker & Lomax, 2016). A one-factor solution for each form was also tested and compared with the expected three-factor model. The reliability was evaluated with a composite reliability (CR) test.

Spearman's ρ was used to evaluate the correlations. Effect sizes of correlation were discussed according to Cohen's (1988) guidelines. The concurrent validity of the g-CEQ-S was assessed from correlations with the GACS (Canale et al., 2019). Convergent validity was estimated by investigating the correlations of each subscale of both forms of the g-CEQ with gambling frequency and gambling-related constructs: disordered gambling symptoms (PGSI), gambling motives (GMQ-F), gambling cognitions (GRCS), and impulsivity traits (S-UPPS-P). Correlations of the g-CEQ-S subscales and emotional states (PANAS) were also considered, as affect is known to influence craving (de Castro et al., 2007; Schlauch, Gwynn-Shapiro, Stasiewicz, Molnar, & Lang, 2013; Sharpe, 2002; Tiffany, 2010).

3. Results

3.1. FACTOR STRUCTURE

The CFA and the CR were computed with the lavaan R Package (Rosseel, 2012) in RStudio (RStudio Team, 2016). Schumacker and Lomax (2016) suggest systematically reporting three fit indices for the CFA: the chi square, the root mean square error of approximation (RMSEA; value of 0.05 to 0.08 indicates a close fit), and the standardized root mean square residual (SRMR; value of < 0.05 indicates a good model fit). Additional commonly used fit indices were also considered, namely, Bentler's comparative fit index (CFI; value close to 0.90 or 0.95 reflects a good fit) and the goodness-of-fit index (GFI; value close to 0.90 or 0.95 reflects a good fit). The CFA for the g-CEQ-S showed that a three-factor solution produced an acceptable fit (χ^2 = 44.52; df=24; p < .01); RMSEA = 0.07 (0.04-0.10), SRMR = 0.03, CFI = 0.99, GFI = 0.97. The factor loadings (see Fig. 3) were all positive and significant (p < .001) and ranged from 0.76 to 0.95. The CR indices were good to excellent for the three subscales: intensity (0.91), imagery (0.86), and intrusiveness (0.91). The one-factor solution produced a poorer fit (χ^2 = 242.36; df = 27; p < .01); RMSEA = 0.22 (0.19-0.24), SRMR = 0.08, CFI = 0.82, GFI = 0.82. The CFA for the g-CEQ-F showed that a three-factor solution also produced an acceptable fit (χ^2 = 47.63; df = 24; p < .01); RMSEA = 0.08 (0.05-0.12), SRMR = 0.04, CFI = 0.96, GFI = 0.95. The factor loadings (see Fig. 3) were all positive and significant (p < .001) and ranged from 0.72 to 0.92. The CR indices were good for the three subscales: intensity (0.86), imagery (0.83), and intrusiveness (0.89).

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

The one-factor solution again produced an inferior fit (χ^2 = 114.26; df = 27; p < .01); RMSEA = 0.17 (0.13-0.19), SRMR = 0.06, CFI = 0.89, GFI = 0.86.

3.2. CORRELATION ANALYSES

Spearman's ρ was evaluated with IBM SPSS Statistics (IBM Corp, 2016). Correlations of interest for the purpose of the study are reported in Table 4. The significance threshold was lowered, according to the Bonferroni correction, in terms of the number of correlations (0.05/ 108 = 0.00046). The three subscales of both forms showed moderate to strong significant correlations between each other. There were also moderate to strong correlations between the g-CEQ-S and the GACS. All subscales of both versions of the g-CEQ significantly correlated with problem gambling symptoms, gambling motives (except financial motives), and gambling cognitions. Regarding the impulsivity facets assessed by the S-UPPS-P, only the sensation seeking subscale correlated with the imagery subscale of the g-CEQ-F. With regard to affect, the intensity subscale of the g-CEQ-S showed significant correlation with positive affect. Finally, gambling frequency was found to correlate with the various subscales of the g-CEQ-F.

Table 3. *Characteristics and reliability for the scales*

Questionnaire	Author (year)	Number and type of items	Response format	Composite reliability in current study (CR)
Positive and Negative Affect Schedule (PANAS; state version)	Gaudreau et al. (2006)	20 items distributed on 2 subscales (positive affect and negative affect)	5-point Likert scale: 1 (*not at all or very slightly*), 2 (*a little*), 3 (*moderately*), 4 (*quite a bit*), 5 (*extremely*)	Subscale CR 0.83 and 0.90, respectively
Problem Gambling Severity Index (PGSI)	Ferris and Wynne (2001)	9 items	4-point Likert scale: 0 (*never*), 1 (*sometimes*), 2 (*most of the time*), 3 (*almost always*)	Total score CR = 0.80
Gambling Craving Scale (GACS)	Canale et al. (2019)	7 items distributed on 2 subscales (pleasure and relief)	7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*)	Subscale CR 0.80 and 0.88, respectively
Short UPPS-P Impulsive Behavior Scale (S-UPPS-P)	Billieux et al. (2012)	20 items distributed on 5 subscales (negative urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking)	4-point Likert scale: 1 (*I agree strongly*), 2 (*I agree somewhat*), 3 (*I disagree somewhat*), 4 (*I disagree strongly*)	Subscale CR ranging from 0.77 to 0.85
Gambling-Related Cognitions Scale (GRCS)	Grall-Bronnec et al. (2012)	23 items distributed on 5 subscales (interpretative bias, illusion of control, predictive control, gambling expectancies, and perceived inability to stop gambling)	7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*)	Subscale CR ranging from 0.73 to 0.86
Gambling Motives Questionnaire-Financial (GMQ-F)	Devos et al. (2017)	15 items distributed on 4 subscales (coping, enhancement, social, and financial)	4-point Likert scale: 1 (*never or almost never*), 2 (*sometimes*), 3 (*often*), 4 (*almost always or always*)	Subscale CR ranging from 0.74 to 0.81

4. Discussion

This research was designed to test the psychometric properties of the two forms of the g-CEQ (strength and frequency), a scale grounded in the EIT and adapted from the CEQ (May et al., 2014). Crucially, the current study represents the first attempt to adapt the CEQ to gambling, whose pathological form (gambling disorder) is to date the only accepted behavioral addiction in the DSM (American Psychiatric Association, 2013). The various analyses conducted showed that this new scale has adequate psychometric properties and thus constitutes a promising tool for future research and clinical practice.

The computed CFA supported the validity of the expected three-factor model of the strength and frequency forms of the g-CEQ, and it showed better model fit than a one-factor solution, corroborating the initial structure of the CEQ (May et al., 2014; Statham et al., 2011). Moreover, similarly to what was done by May et al. (2014), the current study tested the structure of the g-CEQ-

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

S following an induction procedure, which is theoretically sound for measuring craving as a state construct (Canale et al., 2019). The three factors - intensity, imagery, and intrusiveness - of both forms (g-CEQ-F and g-CEQ-S) are composed of three items. These results suggest that the modifications made to adapt the scale (e.g., suppression of one sensorial item, slight modifications in the wording to match the gambling context) were relevant and did not affect the scale's structural validity.

The moderate-to-strong correlations observed between the subscales of the g-CEQ-S and the GACS support its construct validity. Indeed, the relief- and pleasure-related thoughts and imagery constitute the craving experience according to the EIT (Kavanagh et al., 2005), which explains the relation with the GACS, which assesses gambling urge from a positive and negative reinforcement perspective (e.g., feeling high/stimulated, reduce anxiety or sadness). However, and contrary to the GACS, the g-CEQ measures cognitive rather than motivational processes, implying that these two scales are more complementary than competitive.

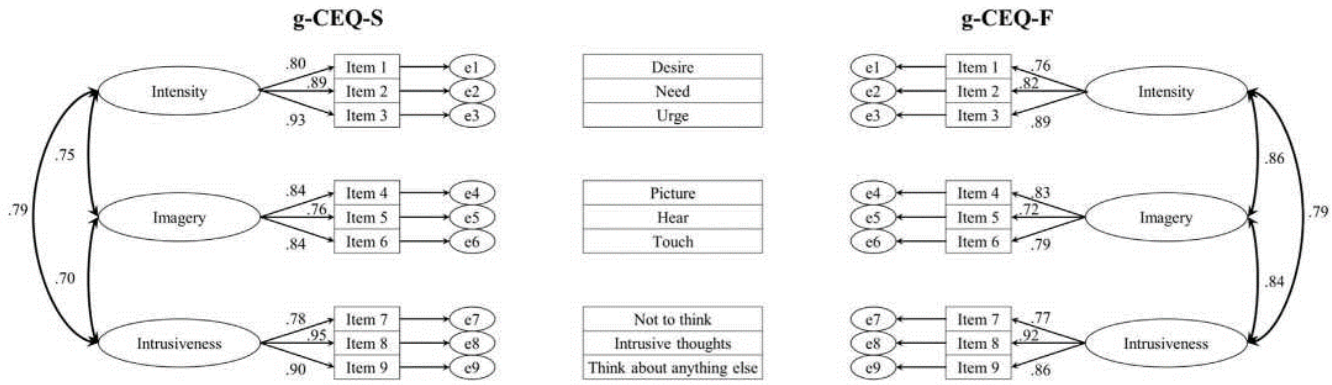
Convergent validity was supported by the correlations (reported in Table 4) with problem gambling symptoms, gambling motives (except for the financial facet), and gambling cognitions, implying a close relation between problem gambling severity and risk factors for problem gambling with the strength and frequency of gambling craving. The differential links observed with impulsivity traits warrant further discussion. Unexpectedly, all correlations of the g-CEQ subscales with the impulsivity facets were of small amplitude and non-significant. Indeed, previous studies generally observed moderate and positive correlations between impulsivity facets (especially negative urgency) and cigarette (Billieux, Van der Linden, & Ceschi, 2007; Doran, Spring, & McChargue, 2007), mobile phone (De-Sola, Talledo, Rubio, & de Fonseca, 2017), or pornography (R0mer Thomsen et al., 2018) cravings. Nevertheless, as previously explained, the scales used in these previous studies measured gambling urge (e.g., anticipation of pleasure or relief) rather than gambling craving (for a more comprehensive account of the distinctions between these two constructs, see Canale et al., 2019), explaining their close link with impulsive traits and behaviors (Gray, 1994; Rochat, Billieux, Gagnon, & Van der Linden, 2018). In contrast, craving as assessed by the CEQ is more linked with cognitive constructs (e.g., mental imagery), implying that they will more likely correlate with measures that assess, for instance, intrusive or obsessive thoughts. Only sensation seeking was correlated with the imagery subscale of the g-CEQ-F, suggesting that participants with higher sensation seeking could more frequently elaborate images related to the object of desire in order to potentially feel, to a lesser extent, the excitement or pleasure provided by gambling.

Some limitations of the study need to be mentioned. First, although appropriated for the analyses conducted, the sample size of our study was relatively modest mainly composed of occasional gamblers from the community. Future studies should thus replicate the findings in a larger sample and in clinical gamblers. Second, the study relied on selfreported measures, which are known to be influenced by different types of biases (e.g., lack of introspection, social desirability). To this end, further validation of the g-CEQ could capitalize on a combination of self-reported measures and physiological measures, as is often the case in craving research, although more research is needed in the field of gambling (Ashrafioun & Rosenberg, 2012). Third, the induction procedure used

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

involved a guided imagery approach, which may have inflated imagery-related features of the triggered cravings. However, this procedure was necessary to ensure the measurement of craving as a state construct (for a related-discussion, see Canale et al., 2019). Fourth, our design can be considered semi-ecological, as we induced a craving state rather than analyzing naturally occurring cravings. Yet, past research has shown that using relevant cues (such as those present in the guided imagery) allows triggering of real craving episodes (Erblich, Montgomery, & Bovbjerg, 2009; Wolfling et al., 2011). Despite these limitations, the g-CEQ is a promising tool for assessing gambling craving based on the EIT, a cognitive model of craving that has grown in popularity in recent years. The g-CEQ allows for the development of theoretically founded, process-based clinical interventions, such as interference-based techniques known to interfere with the vividness of craving experiences (e.g., May, Andrade, Panabokke, & Kavanagh, 2010; Steel, Kemps, & Tiggemann, 2006) and mindfulness-based approaches that help people to accept and cope with the intrusive nature of some craving experiences (Sancho et al., 2018).

Figure 3. *Factorial structure of the strength and frequency forms of the gambling Craving Experience Questionnaire (g-CEQ).*



Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

Table 4. *Spearman's Correlations of the g-CEQ-S and g-CEQ-F Subscales for Concurrent and Convergent Validity.*

	g-CEQ-S			g-CEQ-F		
	Intensity	Imagery	Intrusiveness	Intensity	Imagery	Intrusiveness
g-CEQ-F Intensity	0.55*					
g-CEQ-F Imagery		0.49*				
g-CEQ-F Intrusiveness			0.61*			
GACS Pleasure	0.67*	0.53*	0.46*			
GACS Relief	0.69*	0.57*	0.68*			
PGSI	0.42*	0.34*	0.44*	0.49*	0.48*	0.49*
GMQ-F Social	0.31*	0.33*	0.33*	0.24*	0.38*	0.31*
GMQ-F Coping	0.47*	0.37*	0.49*	0.49*	0.50*	0.51*
GMQ-F Enhancement	0.40*	0.38*	0.35*	0.33*	0.32*	0.27*
GMQ-F Financial	0.19	0.11	0.17	0.24*	0.14	0.23*
GRCS Gambling Expectancies	0.58*	0.42*	0.52*	0.53*	0.54*	0.48*
GRCS Illusion of Control	0.52*	0.37*	0.43*	0.37*	0.43*	0.45*
GRCS Predictive Control	0.52*	0.40*	0.45*	0.44*	0.44*	0.50*
GRCS Inability to Stop Gambling	0.57*	0.36*	0.57*	0.55*	0.52*	0.56*
GRCS Interpretative Bias	0.50*	0.49*	0.46*	0.44*	0.47*	0.44*
Negative Urgency	0.11	0.01	0.12	0.10	0.11	0.08
Positive Urgency	0.11	0.12	0.12	0.06	0.02	0.06
Lack of Premeditation	0.03	−0.02	0.02	0.06	0.06	0.03
Lack of Perseverance	0.00	0.01	0.09	0.02	0.01	0.04
Sensation Seeking	0.15	0.16	0.15	0.20	0.24*	0.17
Positive Affect	0.21*	0.17	0.11			
Negative Affect	0.03	0.01	0.12			
Gambling Frequency				0.47*	0.28*	0.30*

Note. g-CEQ-S = gambling Craving Experience Questionnaire – Strength form; g-CEQ-F = gambling Craving Experience Questionnaire – Frequency form; GACS = Gambling Craving Scale; PGSI = Problem Gambling Severity Index; GMQ-F = Gambling Motives Questionnaire; GRCS = Gambling-Related Cognitions Scale.

* $p < .00046$.

Appendix A. Supplementary data

Supplementary material to this article can be found online at https://doi.Org/10.1016/j.addbeh.2019.02.023.

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

References

American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders: DSM-5. Washington, D.C.: American Psychiatric Association.

Anselme, P., Robinson, M. J. F., & Berridge, K. C. (2013). Reward uncertainty enhances incentive salience attribution as sign-tracking. Behavioural Brain Research, 238, 53–61. https://doi.org/10.1016/j.bbr.2012.10.006.

Ashrafioun, L., Kostek, J., & Ziegelmeyer, E. (2013). Assessing post-cue exposure craving and its association with amount wagered in an optional betting task. Journal of Behavioral Addictions, 2(3), 133–137. https://doi.org/10.1556/JBA.2.2013.011.

Ashrafioun, L., & Rosenberg, H. (2012). Methods of assessing craving to gamble: A narrative review. Psychology of Addictive Behaviors, 26(3), 536–549. https://doi.org/10.1037/a0026367.

Billieux, J., Rochat, L., Ceschi, G., Carré, A., Offerlin-Meyer, I., Defeldre, A.-C., ... Van der Linden, M. (2012). Validation of a short French version of the UPPS-P impulsive behavior scale. Comprehensive Psychiatry, 53(5), 609–615. https://doi.org/10.1016/j.comppsych.2011.09.001.

Billieux, J., Van der Linden, M., & Ceschi, G. (2007). Which dimensions of impulsivity are related to cigarette craving? Addictive Behaviors, 32(6), 1189–1199. https://doi.org/10.1016/j.addbeh.2006.08.007.

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. Addiction, 97(5), 487–499.

Canale, N., Cornil, A., Giroux, I., Bouchard, S., & Billieux, J. (2019). Probing gambling urge as a state construct: Evidence from a sample of community gamblers. Psychologyof Addictive Behaviors. https://doi.org/10.1037/adb0000438 Advance online publication.

Castellani, B., & Rugle, L. (1995). A comparison of pathological gamblers to alcoholics and cocaine misusers on impulsivity, sensation seeking, and craving. Substance Use & Misuse, 30(3), 275–289. https://doi.org/10.3109/10826089509048726.

Clark, L. (2010). Decision-making during gambling: An integration of cognitive and psychobiological approaches. Philosophical Transactions of the Royal Society B: Biological Sciences, 365(1538), 319–330. https://doi.org/10.1098/rstb.2009.0147.

Coates, J. M., Gullo, M. J., Feeney, G. F. X., Kavanagh, D. J., Young, R. M., Dingle, G. A.,... Connor, J. P. (2017). The mini alcohol craving experience questionnaire: Development and clinical application. Alcoholism: Clinical and Experimental Research, 41(1), 156–164. https://doi.org/10.1111/acer.13278.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, N.J: L. Erlbaum Associates.

Cornil, A., Lopez-Fernandez, O., Devos, G., de Timary, P., Goudriaan, A. E., & Billieux, J.(2018). Exploring gambling craving through the elaborated intrusion theory of desire: A mixed methods approach. International Gambling Studies, 18(1), 1–21. https://doi.org/10.1080/14459795.2017.1368686.

Corp, I. B. M. (2016). IBM SPSS statistics for windows (version 24). Armonk, NY: IBM Corp.

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

de Castro, V., Fong, T., Rosenthal, R. J., & Tavares, H. (2007). A comparison of cravingand emotional states between pathological gamblers and alcoholics. Addictive Behaviors, 32(8), 1555–1564. https://doi.org/10.1016/j.addbeh.2006.11.014.

De-Sola, J., Talledo, H., Rubio, G., & de Fonseca, F. R. (2017). Development of a mobile phone addiction craving scale and its validation in a Spanish adult population. Frontiers in Psychiatry, 8, 90. https://doi.org/10.3389/fpsyt.2017.00090.

Devos, G., Challet-Bouju, G., Burnay, J., Maurage, P., Grall-Bronnec, M., & Billieux, J.(2017). Adaptation and validation of the gambling motives questionnaire-financial(GMQ-F) in a sample of French-speaking gamblers. International Gambling Studies, 17(1), 87–101. https://doi.org/10.1080/14459795.2016.1264080.

Doran, N., Spring, B., & McChargue, D. (2007). Effect of impulsivity on craving and behavioral reactivity to smoking cues. Psychopharmacology, 194(2), 279–288. https://doi.org/10.1007/s00213-007-0832-x.

Erblich, J., Montgomery, G. H., & Bovbjerg, D. H. (2009). Script-guided imagery of social drinking induces both alcohol and cigarette craving in a sample of nicotine-dependent smokers. Addictive Behaviors, 34(2), 164–170. https://doi.org/10.1016/j.addbeh.2008.10.007.

Ferris, J., & Wynne, H. (2001). The Canadian problem gambling index. Ottawa, ON: Canadian Centre on Substance Abuse. Retrieved from http://www.cclat.ca/2003%20and%20earlier%20CCSA%20Documents/ccsa-008805-2001.pdf.

Gaudreau, P., Sanchez, X., & Blondin, J.-P. (2006). Positive and negative affective states in a performance-related setting: Testing the factorial structure of the PANAS across two samples of French-Canadian participants. European Journal of Psychological Assessment, 22(4), 240–249. https://doi.org/10.1027/1015-5759.22.4.240.

Goudriaan, A. E., Oosterlaan, J., De Beurs, E., & Van Den Brink, W. (2006). Neurocognitive functions in pathological gambling: A comparison with alcohol dependence, Tourette syndrome and normal controls. Addiction, 101(4), 534–547. https://doi.org/10.1111/j.1360-0443.2006.01380.x.

Gowing, L. R., Ali, R. L., Allsop, S., Marsden, J., Turf, E. E., West, R., & Witton, J. (2015). Global statistics on addictive behaviours: 2014 status report: Addiction global statistics. Addiction, 110(6), 904–919. https://doi.org/10.1111/add.12899.

Grall-Bronnec, M., Bouju, G., Sébille-Rivain, V., Gorwood, P., Boutin, C., Vénisse, J.-L., & Hardouin, J.-B. (2012). A French adaptation of the gambling-related cognitions scale (GRCS): A useful tool for assessment of irrational thoughts among gamblers. Journal of Gambling Issues(27), https://doi.org/10.4309/jgi.2012.27.9.

Gray, J. A. (1994). Personality dimensions and emotion systems. The nature of emotion: Fundamental questions (pp. 329–331).

Hodgins, D. C., & el-Guebaly, N. (2004). Retrospective and prospective reports of precipitants to relapse in pathological gambling. Journal of Consulting and Clinical Psychology, 72(1), 72–80. https://doi.org/10.1037/0022-006X.72.1.72.

Hodgins, D. C., Stea, J. N., & Grant, J. E. (2011). Gambling disorders. The Lancet, 378(9806), 1874–1884. https://doi.org/10.1016/S0140-6736(10)62185-X.

Kavanagh, D. J., Andrade, J., & May, J. (2005). Imaginary relish and exquisite torture: The elaborated intrusion theory of desire. Psychological Review, 112(2), 446–467. https://doi.org/10.1037/0033-295X.112.2.446.

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

Lorains, F. K., Cowlishaw, S., & Thomas, S. A. (2011). Prevalence of comorbid disorders in problem and pathological gambling: Systematic review and meta-analysis of population surveys: Comorbid disorders in pathological gambling. Addiction, 106(3), 490–498. https://doi.org/10.1111/j.1360-0443.2010.03300.x.

May, J., Andrade, J., Kavanagh, D. J., Feeney, G. F. X., Gullo, M. J., Statham, D. J., ... Connor, J. P. (2014). The craving experience questionnaire: A brief, theory-based measure of consummatory desire and craving. Addiction, 109(5), 728–735. https://doi.org/10.1111/add.12472.

May, J., Andrade, J., Panabokke, N., & Kavanagh, D. (2004). Images of desire: Cognitive models of craving. Memory, 12(4), 447–461. https://doi.org/10.1080/09658210444000061.

May, J., Andrade, J., Panabokke, N., & Kavanagh, D. (2010). Visuospatial tasks suppress craving for cigarettes. Behaviour Research and Therapy, 48(6), 476–485. https://doi.org/10.1016/j.brat.2010.02.001.

May, J., Kavanagh, D. J., & Andrade, J. (2015). The elaborated intrusion theory of desire: A 10-year retrospective and implications for addiction treatments. Addictive Behaviors, 44, 29–34. https://doi.org/10.1016/j.addbeh.2014.09.016.

Navas, J. F., Billieux, J., Verdejo-García, A., & Perales, J. C. (2019). Neurocognitive components of gambling disorder: implications for policy, prevention, and treatment. In Bowden-Jones Henrietta, Dickson Cheryl, Dunand Caroline, & Simon Olivier (Eds.). Harm Reduction for Problem Gambling: A Public Health Approach (Routledge. In press).

Oei, T. P. S., & Gordon, L. M. (2007). Psychosocial factors related to gambling abstinence and relapse in members of gamblers anonymous. Journal of Gambling Studies, 24(1), 91–105. https://doi.org/10.1007/s10899-007-9071-7.

Pallanti, S., DeCaria, C. M., Grant, J. E., Urpe, M., & Hollander, E. (2005). Reliability and validity of the pathological gambling adaptation of the Yale-Brown obsessive-compulsive scale (PG-YBOCS). Journal of Gambling Studies, 21(4), 431–443. https://doi.org/10.1007/s10899-005-5557-3.

Potenza, M. N. (2006). Should addictive disorders include non-substance-related conditions? Addiction, 101, 142–151. https://doi.org/10.1111/j.1360-0443.2006.01591.xSUPPL. 1.

Raylu, N., & Oei, T. P. S. (2004a). The gambling related cognitions scale (GRCS): Development, confirmatory factor validation and psychometric properties. Addiction, 99(6), 757–769. https://doi.org/10.1111/j.1360-0443.2004.00753.x.

Raylu, N., & Oei, T. P. S. (2004b). The gambling urge scale: Development, confirmatory factor validation, and psychometric properties. Psychology of Addictive Behaviors, 18(2), 100–105. https://doi.org/10.1037/0893-164X.18.2.100.

Rochat, L., Billieux, J., Gagnon, J., & Van der Linden, M. (2018). A multifactorial and integrative approach to impulsivity in neuropsychology: Insights from the UPPS model of impulsivity. Journal of Clinical and Experimental Neuropsychology, 40(1), 45–61.

Rømer Thomsen, K., Callesen, M. B., Hesse, M., Kvamme, T. L., Pedersen, M. M., Pedersen, M. U., & Voon, V. (2018). Impulsivity traits and addiction-related behaviors in youth. Journal of Behavioral Addictions, 7(2), 317–330. https://doi.org/10.1556/2006.7.2018.22.

Rømer Thomsen, K., Fjorback, L. O., Møller, A., & Lou, H. C. (2014). Applying incentive sensitization models to behavioral addiction. Neuroscience & Biobehavioral Reviews, 45, 343–349. https://doi.org/10.1016/j.neubiorev.2014.07.009.

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. Journal of Statistical Software, 48(2), 1–36.

RStudio Team (2016). RStudio: Integrated development for R (version 1.1.447). Boston, MA: RStudio, Inc. Retrieved from http://www.rstudio.com/.

Sancho, M., De Gracia, M., Rodríguez, R. C., Mallorquí-Bagué, N., Sánchez-González, J., Trujols, J., ... Menchón, J. M. (2018). Mindfulness-based interventions for the treatment of substance and behavioral addictions: A systematic review. Frontiers in Psychiatry, 9. https://doi.org/10.3389/fpsyt.2018.00095.

Schellenberg, B. J. I., McGrath, D. S., & Dechant, K. (2016). The gambling motives questionnaire financial: Factor structure, measurement invariance, and relationships with gambling behaviour. International Gambling Studies, 16(1), 1–16. https://doi.org/10.1080/14459795.2015.1088559.

Schlauch, R. C., Gwynn-Shapiro, D., Stasiewicz, P. R., Molnar, D. S., & Lang, A. R. (2013). Affect and craving: Positive and negative affect are differentially associated with approach and avoidance inclinations. Addictive Behaviors, 38(4), 1970–1979. https://doi.org/10.1016/j.addbeh.2012.12.003.

Schumacker, R. E., & Lomax, R. G. (2016). A Beginner's guide to structural equation modeling (4th ed.). New York: Taylor & Francis.

Sharpe, L. (2002). A reformulated cognitive–behavioral model of problem gambling: A biopsychosocial perspective. Clinical Psychology Review, 22(1), 1–25.

Skinner, M. D., & Aubin, H.-J. (2010). Craving's place in addiction theory: Contributions of the major models. Neuroscience and Biobehavioral Reviews, 34(4), 606–623. https://doi.org/10.1016/j.neubiorev.2009.11.024.

Smith, D. P., Battersby, M. W., Pols, R. G., Harvey, P. W., Oakes, J. E., & Baigent, M. F.(2013). Predictors of relapse in problem gambling: A prospective cohort study. Journal of Gambling Studies.. https://doi.org/10.1007/s10899-013-9408-3.

Sodano, R., & Wulfert, E. (2010). Cue reactivity in active pathological, abstinent pathological, and regular gamblers. Journal of Gambling Studies, 26(1), 53–65. https://doi.org/10.1007/s10899-009-9146-8.

Statham, D. J., Connor, J. P., Kavanagh, D. J., Feeney, G. F. X., Young, R. M. D., May, J., & Andrade, J. (2011). Measuring alcohol craving: Development of the alcohol craving experience questionnaire: Alcohol craving experience questionnaire: ACE. Addiction, 106(7), 1230–1238. https://doi.org/10.1111/j.1360-0443.2011.03442.x.

Steel, D., Kemps, E., & Tiggemann, M. (2006). Effects of hunger and visuo-spatial interference on imagery-induced food cravings. Appetite, 46(1), 36–40. https://doi.org/10.1016/j.appet.2005.11.001.

Tavares, H., Zilberman, M. L., Hodgins, D. C., & el-Guebaly, N. (2005). Comparison of craving between pathological gamblers and alcoholics. Alcoholism: Clinical and Experimental Research, 29(8), 1427–1431. https://doi.org/10.1097/01.alc.0000175071.22872.98.

Tiffany, S. T. (2010). Drug craving and affect. Substance abuse and emotion (pp. 83–108).

Washington, DC, US: American Psychological Association. https://doi.org/10.1037/12067-004.

van Holst, R. J., van den Brink, W., Veltman, D. J., & Goudriaan, A. E. (2010). Why gamblers fail to win: A review of cognitive and neuroimaging findings in pathological gambling. Neuroscience and Biobehavioral Reviews, 34(1), 87–107. https://doi.org/10.1016/j.neubiorev.2009.07.007.

Published in : Addictive Behaviors (2019), vol. 95, pp. 110-117
DOI: https://doi.org/10.1016/j.addbeh.2019.02.023
Status : Postprint (Author's version)

Weber, T., Racanière, S., Reichert, D. P., Buesing, L., Guez, A., Rezende, D. J., ... Wierstra, D. (2017). Imagination-augmented agents for deep reinforcement learning. ArXiv:1707.06203 [Cs, Stat]. Retrieved from http://arxiv.org/abs/1707.06203.

Williams, R. J., West, B. L., & Simpson, R. I. (2012). Prevention of problem gambling: A comprehensive review of the evidence and identified best practices (report prepared for the Ontario problem gambling research centre and the Ontario ministry of health and long term care). Canada, Ontario: Problem Gambling Research Centre.

Wölfling, K., Mörsen, C. P., Duven, E., Albrecht, U., Grüsser, S. M., & Flor, H. (2011). To gamble or not to gamble: At risk for craving and relapse – Learned motivated attention in pathological gambling. Biological Psychology, 87(2), 275–281. https://doi.org/10.1016/j.biopsycho.2011.03.010.

World Health Organization (2018). ICD-11 for mortality and morbidity statistics [internet]. Geneva, Switzerland: World Health Organization. Retrieved from https://icd.who.int/browse11/l-m/en.

Young, M. M., & Wohl, M. J. A. (2009). The gambling craving scale: Psychometric validation and behavioral outcomes. Psychology of Addictive Behaviors, 23(3), 512–522. https://doi.org/10.1037/a0015043.

Young, M. M., Wohl, M. J. A., Matheson, K., Baumann, S., & Anisman, H. (2008). The desire to gamble: The influence of outcomes on the priming effects of a gambling episode. Journal of Gambling Studies, 24(3), 275–293. https://doi.org/10.1007/s10899-008-9093-9.