Factors associated with suicidal risk among a French cohort of problem gamblers seeking treatment

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ABSTRACT

Compared to general population, pathological gamblers are 3.4 times more likely to attempt suicide. Our objective was to identify specific profiles of problem gamblers (PGs) with suicidal risk according to sociodemographic, clinical and gambling characteristics.

The PGs cohort, called "EVALJEU", consists in the inclusion of any new PG seeking treatment in our Department. Patients underwent a semi-structured clinical interview and completed self-report questionnaires. The "suicidal risk module" of the Mini International Psychiatric interview (MINI) allowed to constitute two groups of patients that were compared, according to the presence of a suicidal risk. A logistic regression was performed to identify factors related to suicidal risk in PGs. In our sample (N=194), 40.21% presented a suicidal risk. A history of major depression and anxiety disorders were predictors of suicidal risk as well as the perceived inability to stop gambling.

Suicidality is a significant clinical concern in PGs. Therefore, three specific predictors, identified by our study, must be assessed.

1. Introduction

Gambling disorder is a behavioral addiction characterized by a loss of control over gambling which then becomes the subject's only interest, prevailing over all his/her other activities, causing serious harmful consequences to social, family, or financial life (APA, 2013). Prevalence studies found a 1.6% lifetime prevalence of pathological gambling and a 3.8% lifetime prevalence of problem gambling (Shaffer and Hall, 2001).

Among many potential adverse consequences of gambling, the most serious is suicidal behavior as 20% of pathological gamblers will attempt suicide in their lifetime (Moghaddam et al., 2015a). Furthermore, compared to the general population, pathological gamblers are 3.4 times more likely to attempt suicide (Moran, 1969; Hollander et al., 1998; Newman and Thompson, 2003). Though the range varies significantly, 25% to 80% of gambling crisis hotline callers describe suicidal ideation (Sullivan et al., 1994; Ledgerwood et al., 2005), while clinical samples have shown rates of suicidal ideation in pathological gamblers to be between 17% and 80% (Blaszczynski et al., 1986; Lesieur and Blume, 1990; Frank et al., 1991; Horodecki, 1992). Among pathological gamblers seeking treatment, 12% have already attempted suicide at some time in their life (Ledgerwood and Petry, 2004).

It is recognized that different psychological factors are linked to suicidal risk in problem gamblers (PGs) while some others are linked to suicidal risk overall or to pathological gambling generally speaking.

First, many studies emphasized the links between gambling problems and impulsivity. Recent works explored the links between impulsivity, Attention Deficit/Hyperactivity Disorder (ADHD) and pathological gambling, and found that the impulsivity profile of at-risk and pathological gamblers varies according to the associated psychiatric and addictive disorders (Grall-Bronnec et al., 2011, 2012b). Among the psychiatric disorders, ADHD is one of the disorders most frequently associated with impulsivity and pathological gambling (Derevensky et al., 2007; Grall-Bronnec et al., 2011). Blaszczynski and Nower included impulsivity as a major characteristic of a subtype of pathological gamblers called antisocial impulsivist (Blaszczynski and Nower, 2002). Similarly, a high level of impulsivity is associated with a poorer prognosis concerning the ability to overcome pathological gambling (INSERM,

2008; Grall-Bronnec et al., 2012b).

Some studies also determined that adaptive capacity is a clinical variable found in both suicidal behaviors and pathological gambling. With respect to pathological gambling, poor coping skills and maladaptive defense mechanisms are also found to be factors that facilitate the continuation of problem gambling (Wood and Griffiths, 2007). Coping mechanisms and defense style are incriminated in suicidal risk as well as in different psychiatric comorbidities (Corruble et al., 2004).

Apart from those psychological factors, different studies also identified stressful life events as risk factors common to both pathological gambling and suicidal risk. While traumatic events, such as childhood sexual abuse, are described as risk factors of pathological gambling (Petry et al., 2005a), stressful life events are more prevalent among those who attempt suicide than they are among those with suicidal ideation without attempts (McFeeters et al., 2015).

Furthermore, we did not find studies including gambling characteristics as a potential risk factor in suicidal risk in problem gamblers.

Despite the close association between suicidal risk and pathological gambling, their common underlying risk factors, as well as the impact of this association concerning the management of PGs, we found few extant or prospective studies exploring the multivariate factors of suicidal behaviors risk in PGs.

The objective of our work was to identify the specific profile of PGs who are considered at risk for suicide, based on sociodemographic, clinical and gambling characteristics. The underlying idea was to facilitate the early detection of suicidal risk in PGs seeking treatment, and to propose therapeutic tracks adapted to reduce the dramatic consequences of this comorbidity.

2. Material and methods

2.1. Participants

Our department is an outpatient-center specialized in gambling disorder management. The patients were offered individual psychological and social interventions, as well as Cognitive Behavioral Therapy group. In 2009, we constructed a cohort including any new patient starting a treatment for this particular reason with the aim of highlighting risk factors of gambling disorder initiation and persistence. The main criterion for inclusion in the EVALJEU Cohort was being a "problem gambler" (DSM-IV diagnostic criteria for Pathological Gambling ≥ 3) in the previous 12 months. The presence of at least 5 DSM-IV diagnostic criteria is required to confirm the diagnosis of pathological gambling, but the presence of 3 or 4 criteria is enough to suggest "at risk gambling" or "problem gambling". Both pathological and problem gamblers require care, which explains the choice of the threshold of 3 (APA, 1994; Toce-Gerstein et al., 2003). The exclusion criteria included cognitive impairment and difficulties in reading and writing French. The local Research Ethics Committee approved this study, and all subjects provided written informed consent.

2.2. Measurements

All patients underwent a semi-structured clinical interview and completed self-report questionnaires. For the purpose of this specific study, we focused on sociodemographic and gambling characteristics, axis 1 disorders, life events and personality traits.

2.2.1. Socio demographic characteristics
We collected information about age, gender, marital status, graduation, and work status.

2.2.2. Clinical characteristics
2.2.2.1. **Mini International Neuropsychiatric Interview (MINI)** (Lecrubier et al., 1997). The MINI is a structured diagnostic interview that is compatible with the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10), and the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). Risk of suicide was defined in the present study according to the MINI "suicidal risk module" (Sheehan et al., 1998).

This module includes three questions on suicidal ideation within the past month ('Did you think you would be better off dead or wish you were dead?', 'Did you want to harm yourself?' and 'Did you think about suicide?'), one question on suicide plans within the past month ('Did you have a suicide plan?'), one question on suicide attempts within the past month ('Did you attempt suicide?') and one question on lifetime history of suicide attempts ('In your lifetime, did you ever make a suicide attempt?').

MINI interview also assessed axis 1 disorders, especially mood disorders, anxiety disorders, psychotic syndrome, alcohol use disorders, and substance use disorders.

2.2.2.2. **Wender-Utah Rating Scale-Child (WURS-C)** (Ward et al., 1993; Caci et al., 2010). This self-report questionnaire is a tool that has been validated for retrospective evaluation of ADHD in childhood in adults. Its specificity (89.1%) is good, which limits the risk of giving a wrong diagnosis. It is designed to assess ADHD symptoms represented by 25 items on 5-point Likert scales. The authors established that a score greater than or equal to 46/100 would allow for the diagnosis to be made (Ward et al. 1993; Caci et al., 2010).

2.2.2.3. **UPPS Impulsive Behaviour Scale (UPPS)** (Whiteside et al., 2005; Van der Linden et al., 2006). At the beginning of the inclusion phase, we used the first version of the UPPS-Impulsive Behavior Scale, which was developed in the aim of measuring four distinct pathways of impulsive behavior: "Urgency" (tendency to engage in impulsive behaviors under conditions of negative affects), (lack of) "Premeditation" (difficulty in thinking and reflecting on the consequences of an act before engaging in that act), (lack of) "Perseverance" (inability to remain focused on a task that may be boring or difficult) and "Sensation Seeking" (tendency to enjoy and pursue activities that are exciting and openness to trying new experiences that may or may not be dangerous) (Whiteside et al., 2005; Van der Linden et al., 2006).

Then, we used the UPPS-P, a shortened version (20 items instead of 45), which contains a fifth dimension: Positive Urgency (tendency to act rashly when in an intense positive affective state), the previous Urgency dimension becoming Negative Urgency (Billieux et al., 2012). In order to standardize the results, we have transformed the UPPS completed by the first patients into the UPPS-P, not taking into account the Positive Urgency items.

2.2.2.4. **Shorter 125-item version of the Temperament and Character Inventory (TCI-125)** (Cloninger et al., 1993; Chakroun-Vinciguerra, 2005). The TCI-125 is used to rapidly explore the four temperament (Novelty Seeking, Harm Avoidance, Reward Dependence and Persistence) and the three character (Self-Directedness, Co-operation and Self-Transcendence) dimensions of personality defined by Cloninger's psychobiological model (De Fruyt et al. 2000).

2.2.2.5. **Defense Style Questionnaire (DSQ)** (Bond, 2004). This questionnaire allows the identification of the predominant defense style for each participant. Three defense styles were considered, bringing together several defense mechanisms: the Mature style combines sublimation, humor, anticipation and suppression; the Neurotic style combines pseudo-altruism, undoing, idealization and reaction formation; the Immature style combines projection, passive aggression, acting-out, isolation, devaluation, autistic fantasy, denial, displacement, dissociation, splitting, rationalization and somatization.

2.2.2.6. **Questionnaire of Life Events EVE** (Ferreri et al., 1987). It consists of 37 items representing the most frequently listed events by the usual scales of life events, grouped into 5 areas (family, professional life, social life, marital and emotional life, health). We have added another field, called "other traumatic events," consisting of 3 items, to explore physical or sexual abuse. For better feasibility and understanding of patients, we used a simplified version of EVE questionnaire. Patients were interviewed about their life events, and we collected information about the period in which these events took place (childhood, adolescence and/or adulthood) and about the feelings related to the events (traumatic event or not, and intensity of trauma assessed on a scale from 0 to 10). The final score is obtained by summing the intensity of trauma of each traumatic event, giving a global cumulative score of traumatic events.

2.2.3. Gambling characteristics
2.2.3.1. **Pathological gambling section in the DSM-IV** (APA, 1994). Well-trained staff members with experience with pathological gamblers conducted an interview concerning the gambling course, the gambling habits and their consequences. Patients were included in the EVALJEU cohort if they fulfilled at least 3 (out of 10) DSM-IV diagnostic criteria for Pathological Gambling. This categorical approach was completed using a dimensional approach by adding the number of positive DSM-IV criteria. The number of positive diagnostic criteria is correlated with the severity of the disorder (Toce-Gerstein et al., 2003).

2.2.3.2. **Gambling Related Cognitions Scale (GRCS)** (Raylu and Oei 2004; Grall-Bronnec et al., 2012a). The GRCS is a 23-item self-report scale divided in 5 subscales

that assesses a range of gambling-related cognitive biases and errors: "illusion of control" (GRCS-IC), "predictive control "(GRCS-PC), "interpretative bias" (GRCS-IB), "gambling-related expectancies" (GRCS-GE), "perceived inability to stop gambling" (GRCS-IS). Raylu and Oei (2004) reported adequate internal consistency for the total GRCS scale (alpha =.93), as well as for the five subscales (alphas =.77–.91).

2.2.4. Other gambling characteristics

Negatives consequences of gambling were assessed using five ("Social", "Family", "Professional", "Health" and "Financial" damages) 6-point Likert scales (Not at all, very few, few, averagely a lot, extremely). Questions about support of family or friends were asked. Finally, the patients were asked to define their gambling craving intensity on a scale from 0 to 100, and their perceived control over gambling on a scale from 0 to 100.

2.3. Statistical analysis

A descriptive analysis of the socio-demographic, clinical and gambling characteristics was carried out in order to obtain means, medians and standard deviations for continuous variables, and the number of people and percentage for categorical variables. Exploratory univariate analyses were performed to explore the links between suicidal risk and socio-demographic, clinical and gambling characteristics. Student tests were used for continuous variables and Chi-square or Fisher test for categorical variables.

Thereafter logistic regression was performed using an iterative selection procedure to select the variables that were significantly associated with suicidal behaviors, as assessed by the likelihood ratio test (variable candidates for the model were those associated with risk of suicide in univariate analyses with the $p < 0.20$ criterion and were subsequently selected in the final model using the $p < 0.05$ criterion) (Hosmer et al., 2013). Multicollinearity was tested at the beginning of the analysis. We assured in our analysis that multicollinearity was not influencing our final model. We checked the results stability, our logistic regression was checked with a forward and a backward method.

The corresponding odds ratio and associated 95% confidence interval were estimated. Discrimination of the final logistic model which describes its ability to discriminate the presence and absence of suicidal risk was assessed using the area under the receiver operating characteristic (ROC) curve and the goodness-of-fit of the model was assessed using the Hosmer-Lemeshow test. The statistical analysis was carried out with SAS 9.1 and R statistical software (SAS Institute, Inc.).

The conditions for validity were verified for all of the tests and the models.

3. Results

3.1. Description of the sample

194 subjects were included in the study. The characteristics of the participants are presented in Table 1. A risk of suicide was revealed, at the time of inclusion, in 40.21% of the participants, and 21.65% of them reported having attempted suicide during their lifetime. Serious family and financial damages were frequently reported.

3.2. Participants at risk of suicide versus those not at risk of suicide

Table 2 displays the comparisons of the two groups according to socio-demographic, clinical and gambling characteristics.

Variable candidates for the model were those associated with a risk of suicide in univariate analyses with the $p < 0.20$ criterion. From the 47 starting variables, 33 were tested in the multivariate analyses: all the socio-demographic characteristics; axis 1 disorders including mood disorders (major depression, other mood disorders, history of suicide attempts), anxiety disorders, ADHD in childhood and alcohol use disorder; personality traits including negative urgency, lack of premeditation and sensation seeking (UPPS), novelty seeking, harm avoidance, self-directness and self-transcendence (TCI), neurotic and immature defense style (DSQ); all the gambling characteristics, except support by family or friends, social, family and professional damages, and GRCS sum score.

Multicollinearity was initially found between some variables. But all the variables that were significantly associated with suicidal risk in our sample were totally independent in the final model.

Table 1
Characteristics of the sample (N = 194).

	Mean (standard deviation) or percentage N = 194
Socio-demographic characteristics	
Sex (% males)	82.47%
Age (years)	41.77 (13.33)
Marital status (% single, divorced, widowed)	43.3%
Work status (% without any job)	34.02%
Educational attainment (% ≤ 12 years)	71%
Axis 1 disorders current or past (MINI; WURS-C)	
Mood disorders	
Major depression	52.58%
Others mood disorders	8.76%
Risk of suicide	40.21%
History of suicide attempt	21.65%
Anxiety disorders	43.81%
Psychotic syndrome	3.09%
ADHD in childhood	26.80%
Addictive disorders	
Nicotine dependence	56.19%
Alcohol use disorder	41.75%
Substance use disorder (excluding alcohol and nicotine)	20.62%
Personality (UPPS or UPPS-P; TCI; DSQ; MINI)	
Impulsivity	
Negative urgency (/16)	10.93 (2.91)
(lack of) Premeditation (/16)	8.87 (2.38)
(lack of) Perseverance (/16)	7.93 (2.18)
Sensation seeking (/16)	10.22 (2.92)
Temperament	
Novelty seeking (/100)	60.18 (17.73)
Harm avoidance (/100)	50.75 (24.86)
Reward dependence(/100)	56.57 (17.95)
Persistence (/100)	55.03 (30.25)
Character	
Self-directedness (/100)	58.79 (20.45)
Cooperativeness (/100)	72.40 (16.52)
Self-transcendence (/100)	30.80 (22.91)
Defense Style	
Mature (/9)	5.63 (1.29)
Neurotic (/9)	4.63 (1.45)
Immature (/9)	4.38 (1.25)
Antisocial personality disorder	5.67%
Gambling characteristics	
Severity of gambling	
DSM-IV score (/10)	6.58 (1.93)
GRCS total score (/161)	79.29 (24.35)
Perceived control over gambling (0–100)	39.30 (29.16)
Gambling craving (0–100)	50.93 (32.67)
Therapeutic goals (to stop gambling)	49.47%
Support by family or friends	87.43%
Negative consequences	
Social damages (a lot, extremely)	23.71%
Family damages (a lot, extremely)	58.24%
Professional damages (a lot, extremely)	10.82%
Health damages (a lot, extremely)	39.69%
Financial damages (a lot, extremely)	72.68%

We checked the results stability, our logistic regression was checked with a forward method, the results were the same than in the backward method. This sensibility analysis- checks that

Table 2
Comparison between problem gamblers with or without suicidal risk, according to their socio-demographic, clinical and gambling characteristics (N=194).

	Mean (standard deviation) or percentage		
	"Risk of Suicide" (n=78)	"No risk of suicide" (n=116)	p-Value
Socio-demographic characteristics			
Sex (% males)	75.64%	87.07%	**0.040**
Age (years)	44.33(12.43)	40.04 (13.69)	**0.027**
Marital status (% single, divorced, widowed)	55.13%	35.34%	**0.006**
Work status (% without any job)	42.31%	28.45%	**0.045**
Educational attainment (% ≤ 12 years)	78.21%	67.24%	0.096
Life events (EVE)	19.31 (38.18)	9.73 (24.56)	0.052
Axis 1 Disorders current or past (MINI; WURS-C)			
Mood disorders			
Major depression	76.36%	37.93%	**< 0.0001**
Others mood disorders	16.67%	3.45%	**0.0031**
History of suicide attempts	53.85%	0	**< 0.0001**
Anxiety disorders	62.82%	31.03%	**< 0.0001**
Psychotic syndrome	3.85%	2.59%	0.686
ADHD in childhood	39.74%	18.10%	**0.0008**
Addictive disorders			
Nicotine dependence	61.54%	52.59%	0.217
Alcohol use disorder	48.72%	37.07%	0.106
Substance use disorder (excluding alcohol and nicotine)	23.08%	18.97%	0.487
Personality (UPPS or UPPS-P; TCI; DSQ; MINI)			
Impulsivity			
Negative urgency (/16)	11.42 (3.04)	10.57 (2.76)	0.052
(lack of) Premeditation (/16)	9.26 (2.49)	8.59 (2.26)	0.061
(lack of) Perseverance (/16)	8.09 (2.43)	7.81 (1.99)	0.395
Sensation seeking (/16)	10.61 (3.08)	9.94 (2.77)	0.127
Temperament			
Novelty seeking (/100)	63.32 (17.58)	58.01 (18.02)	**0.047**
Harm avoidance (/100)	59.32 (25.63)	44.82 (22.59)	**< 0.0001**
Reward dependence(/100)	55.59 (18.96)	57.25 (17.27)	0.539
Persistence (/100)	54.05 (29.74)	55.70 (30.71)	0.719
Character			
Self-directedness (/100)	50.02 (21.48)	64.85 (17.36)	**< 0.0001**
Cooperativeness (/100)	72.55 (18.27)	72.29 (15.28)	0.921
Self-transcendence (/100)	36.14 (25.03)	27.10 (20.64)	**0.008**
Defense Style			
Mature (/9)	5.56 (1.44)	5.68 (1.18)	0.508
Neurotic (/9)	4.83 (1.7)	4.49 (1.23)	0.151
Immature (/9)	4.67 (1.29)	4.18 (1.18)	**0.009**
Antisocial personality disorder	7.69%	4.31%	0.318
Gambling characteristics			
Severity of gambling			
DSM-IV score (/10)	7.12 (1.89)	6.22 (1.87)	**0.001**
GRCS total score (/161)	88.82 (23.62)	72.81 (22.78)	**0.0002**
GRCS-GE (/28)	16.22 (5.29)	13.42 (5.40)	**0.004**
GRCS-IC (/28)	9.20 (5.13)	7.03 (3.78)	**0.011**
GRCS-PC (/42)	20.86 (7.38)	17.21 (6.74)	**0.004**
GRCS-IS (/35)	25.48 (6.84)	20.95 (7.08)	**0.0005**
GRCS-IB (/28)	16.71 (6.48)	14.20 (5.97)	**0.027**
Duration of the gambling problems (years)	8.20 (8.09)	5.72 (5.92)	**0.022**
Perceived control over gambling (0–100)	29.68 (27.22)	45.69 (28.75)	**0.0001**

Table 2 (*continued*)

	Mean (standard deviation) or percentage		
	"Risk of Suicide" (n=78)	"No risk of suicide" (n=116)	p-Value
Gambling craving (0–100)	57.76 (32.26)	46.34 (32.27)	**0.016**
Therapeutic goals (to stop gambling)	48.05%	50.44%	**0.639**
Support by family or friends	85.92%	88.39%	0.622
Negative consequences			
Social damages (a lot, extremely)	29.87%	19.82%	0.218
Family damages (a lot, extremely)	62.82%	55.17%	0.712
Professional damages (a lot, extremely)	7.69%	9.48%	0.762
Health damages (a lot, extremely)	51.94%	31.89%	**0.01**
Financial damages (a lot, extremely)	88.46%	62.06%	**0.001**

GRCS: Gambling Related Cognitions Scale
GRCS-GE: GRCS-Gambling-related Expectancies; **GRCS-IC:** GRCS-Illusion of Control; **GRCS-PC:** GRCS-Predictive Control; **GRCS-IS:** GRCS-Inability to Stop gambling; **GRCS-IB:** GRCS-Interpretative Bias.

Table 3
Multivariate logistic regression analysis (final model) showing factors associated with a risk of suicide (N=124).

Variables	OR	Ci $_{95\%}$ (OR)	p-Value
Major depression (current or past)	3.96	[1.61–9.69]	0.0026
Anxiety disorder (current or past)	3.2	[1.34–7.45]	0.0067
GRCS-IS	1.07	[1.01–1.144]	0.0182

OR: Odds Ratio; **CI$_{95\%}$:** 95% Confidence Interval.

multicollinearity did not influence our results. The parameters estimation and their standard errors were unchanged. Moreover, the Hosmer-Lemeshow test is a statistical test of goodness of fit for logistic regression. For our model, the p-value was 0.2019, it allowed us to confirm that our logistic regression model was really suitable. The area under the ROC curve was 0.776, thus indicating that the model discriminated well between the patients who were at risk of suicide and those who were not. Said variables were: major depression (current or past), anxiety disorders (current or past) and a high score on the GRCS-IS (Table 3).

4. Discussion

4.1. A high level of suicidal risk in PGs

There was an exceptionally high prevalence of suicidal risk among our cohort, which was comprised of PGs seeking treatment, what with 40.21% of them being diagnosed as "at risk of suicide" at inclusion. This result was consistent with the literature. A recent study conducted among the general population in the USA reported that 49.2% of those diagnosed as pathological gamblers experienced suicidal ideation (Moghaddam et al., 2015a). Similar to this finding, suicide attempts among those in our sample were disproportionately high with more than one out of five reporting that they had attempted suicide during their lifetime. This rate was high compared to the rate of 18.3% among pathological gamblers in general population (Moghaddam et al., 2015a), and even to the rate of 12% among pathological gamblers seeking treatment (Ledgerwood and Petry, 2004).

4.2. Three predictive factors of suicidal risk in PGs

We identified in our study an original trivariate model of predictive factors of suicidal risk in PGs seeking treatment. This model includes psychological factors, namely major depression and anxiety disorders, and gambling related cognitions (inability to stop gambling).

4.2.1. Mood disorders

The most significant comorbidities associated with the risk of suicide in our study were mood disorders (major depression, other mood disorders) and anxiety disorders. More than half of the PGs in our study were suffering or had suffered from major depression in their lifetime, which supported the many studies that claimed major depression was a common disorder among PGs, particularly when they were seeking treatment (Petry and Kiluk 2002; Maccallum and Blaszczynski 2003; Ledgerwood and Petry 2004; Sinclair et al., 2014). Moreover, our regression model indicated that major depression (current or past) was a clear predictor of suicidal risk among PGs, which lined up with studies that have demonstrated that depressive disorders were associated with an increased risk of suicide attempts among patients with substance related disorders seeking treatment (Kausch, 2003; Yuodelis-Flores and Ries, 2015). Depression, with or without suicidal ideation, can appear either prior to the gambling disorder as a vulnerability factor (Kausch 2003; Quigley et al., 2014) or as a negative consequence of gambling (Kausch, 2003). Moreover, depressed gamblers may perceive and report more negative damages than non-depressed gamblers, given that depression is characterized by negative interpretation and memory biases (Joormann and Gotlib 2010; Quigley et al., 2014).

4.2.2. Anxiety disorders

The second predictor of suicidal risk in the regression model was anxiety disorders (current or past). Our rate of lifetime anxiety disorders corroborated previous studies that had found that the rate of pathological gamblers seeking treatment who also presented with a current anxiety disorder was high (Ibáñez et al., 2001; Ibáñez et al., 2003). However, unlike the strong link between depression and suicidal risk among pathological gamblers, anxiety disorders had not been strongly determined as predictors of suicidal risk among pathological gamblers until now.

4.2.3. Gambling characteristics: the perceived inability to stop gambling

We found that PGs at risk of suicide scored higher than those not at risk of suicide on all five dimensions assessed by the GRCS. Among these dimensions, the perceived inability to stop gambling was the third predictor of suicidal risk in PGs in our regression model, a relation that was unknown until this study.

This cognitive dimension reflected the person's loss of control over his/her gambling and over the perceived need to gamble. This finding was consistent with the univariate analysis which concluded that PGs with suicidal risk experienced significantly higher levels of gambling cravings than the others. Petry and Kiluk previously noted that gamblers with suicidal ideation who sought treatment reported increased gambling cravings compared to non-suicidal gamblers (Petry and Kiluk 2002). Since this predictive factor is very consistent and easy to identify in PGs seeking treatment, it should be sought out. Besides, working on self-efficacy capacities could be a promising therapeutic track in the management of PGs, as it may allow to reduce the more harmful consequence of problem gambling, which is suicide.

While no other variable was found to be a predictor of suicidal risk in the multivariate model, we did find significant differences in the univariate model between PGs with and without suicidal risk.

4.3. Gender differences in suicidal risk in PGs

Suicide risk was more prevalent in women in our study, despite an overrepresentation of men in our sample of PGs (82.47%). Furthermore, while men are more at risk of problem gambling (Husky et al., 2015), women with gambling disorders who are also at risk of suicide are more likely to acknowledge their problems and receive services (Potenza et al., 2001; Husky et al., 2015). While many studies highlighted the stronger association between addictive disorders and suicidal behaviors in women than in men (Wilcox et al., 2004; Yuodelis-Flores and Ries, 2015), some studies of PGs did not find any gender differences (Petry and Kiluk, 2002). Nonetheless, it has been determined that PGs who are also diagnosed as being at risk of suicide have a lower educational level, which is a major factor that contributes to both gambling severity and suicidal risk (Welte et al., 2004; Husky et al., 2015).

4.4. Social, familial and financial status and suicidal risk in PGs seeking treatment

In our study, suicidal risk was associated with a significantly higher level of unemployment. Our results matched with those of Thon and Preuss (2014). They had found that PGs seeking treatment with a risk of suicide were more often unemployed than the general population (Thon et al., 2014). Additionally, the majority of suicidal pathological gamblers lived alone, a finding supported by the literature, which notes that separation, divorce or partnership disruption are predictive factors of suicidal behaviors (Yuodelis-Flores and Ries, 2015). A low standard of living and family conflicts are associated with suicide among pathological gamblers (Maccallum and Blaszczynski, 2003). However, contrary to the literature, PGs with suicidal risk in our study were significantly older (44 years vs 40 years). In the literature, young age is often perceived as a suicidal risk factor in individuals with addictive disorders (McCormick et al., 1984; Preuss et al., 2002; Roy 2009; Yuodelis-Flores and Ries, 2015). Accordingly, we presumed that the association between suicidal risk and older age was linked to gambling behavior characteristics. Indeed, PGs with suicidal risk reported a significantly longer history of gambling and greater damages, especially financial and familial. Severe financial and family consequences were significantly associated with suicide risk in our study, a finding that was again consistent with the literature (Blaszczynski and Farrell 1998; Meltzer et al., 2011). With respect to pathological gambling, bankruptcies, debts and illegal behaviors are more common among gamblers with suicidal ideation (Petry and Kiluk 2002; Kausch 2003; Maccallum and Blaszczynski 2003; Ledgerwood and Petry 2004; Wong et al., 2010), and unmanageable debt has been identified as a contributing factor in suicides of pathological gamblers (Wong et al., 2010).

4.5. Psychiatric disorders and suicidal risk in PGs seeking treatment

4.5.1. Substance use disorders: a high prevalence, but no association with suicidal risk in or sample

A large majority of the sample in this study reported an alcohol use disorder (56.19%), This close association between substance use disorders and problem gambling is well-known (Quigley et al., 2014). The rate of alcohol use disorder is six times greater among pathological gamblers than it is among the general population (Petry et al., 2005b; Bischof et al., 2015). However, no substance use disorder (including nicotine, alcohol and other substance use disorder) was associated with suicidal risk in our PGs sample,

contrary to the findings of the literature. Alcohol use disorder is often defined as a risk factor linked to the severity of gambling and the suicidal risk in PG (Welte et al., 2004; Petry et al., 2005b; Hodgins et al., 2006; Lister et al., 2015), and substance use disorders are linked to suicide risk in some studies (Kausch, 2003).

4.5.2. ADHD, impulsivity and suicidal risk in PGs

Nearly a quarter of our sample reported a childhood history of ADHD, in accordance with previous results (Aymamí et al., 2015). One of the cardinal features shared between ADHD and pathological gambling is impulsivity (Grall-Bronnec et al., 2011). PGs in our sample exhibited a high level of impulsivity on all four dimensions of the UPPS. We supposed that we had a high representation of this trait, because our study concerned a sample of PGs seeking treatment, which are known to be the most severe PGs. If we refer to the pathways model of Blaszczynski, we may have gamblers with a higher level of severity including higher level of impulsivity in our sample (Blaszczynski and Nower 2002). ADHD was significantly more represented in PGs with suicidal risk, but we did not find differences in impulsivity between our two PGs groups with or without suicidal risk, and the level of impulsivity was not associated to the risk of suicide in the final model after the multivariate logistic regression analysis. The association between ADHD and suicidal risk in PGs could be explained by other psychological traits. For instance, Davtian et al. determined that PGs with ADHD had a lower self-esteem, a higher emotional instability and a greater predisposition for stress (Davtian et al., 2012).

4.6. Personality and temperament trait

While no measured psychological trait was found to be a predictor of suicidal risk in this study, we did find some differences in the univariate model between PGs with and without suicidal risk.

4.6.1. Novelty seeking and harm avoidance and higher level of suicidal risk

With respect to the TCI results, we identified significant differences in temperament between the two groups. PGs with suicidal risk exhibited higher levels of novelty seeking and harm avoidance. Harm avoidance is linked to negative emotionality, particularly anger-related problems, which are prominent behavioral characteristics of suicidal behavior (Perroud et al., 2013) and thus is considered a strong predictor of suicidal risk (Calati et al., 2008, Conrad et al., 2009, Perroud et al., 2011). The "novelty seeking" construct, which incorporates impulsivity (Perroud et al., 2011) and is linked to psychiatric disorders in some studies (Perroud et al., 2013), was also very high in our study, especially among PGs at risk of suicide.

4.6.2. Immature defense style associated with suicidal risk

The score of immature defense style, which may well reflect a maladaptive way of coping, was significantly higher in PGs with suicidal risk. Consistently with this finding, previous studies have found that the immature defense style is a risk factor of suicidal behavior and suicide attempts (Corruble et al., 2004), independently of problem gambling. The results regarding immature defense styles were linked to the high rate of major depression in our sample. A meta-analysis performed in 2010 had found that individuals with major depressive disorders exhibited more immature and neurotic defense styles when compared to controls (Calati et al., 2010). We found very few studies about defense styles and problem gambling, other than those that focused on the maladaptive process and escapism, which are common characteristics of gamblers (Wood and Griffiths, 2007; Grall-Bronnec et al., 2012b). Our results led us to conclude that immature defense

styles could be an interesting therapeutic target for cognitive and behavioral therapy offered to PGs in order to lower suicidal risk.

4.7. Traumatic life events: no links with suicidal risk in our study

PGs are predisposed to stress (Davtian et al., 2012), and rates of stressful life events are high among pathological gamblers (Petry et al., 2005a) and especially among pathological gamblers at risk of suicide. Surprisingly, we did not find significant differences on traumatic life events between the two groups of PGs with and without suicidal ideation. Some authors distinguished differences in life events between those who had attempted suicide and those with only suicidal ideations (McFeeters et al., 2015). We did not differentiate these two events in our study, as our objective was to identify risk factor of a global suicidal risk.

4.8. Strengths and weaknesses of the study

The results must be viewed taking the strengths and weaknesses of the study into consideration. The main limit arises from the way in which recruitment was conducted, as there was an undeniable selection bias. It is well acknowledged that PGs who seek treatment may have a more severe problem than those who do not seek treatment. Furthermore, our study population was predominantly male (82.5%), which is in sharp contrast with the sex ratio in the general population. According to Costes et al. (2015), women represent 49% of gamblers and 30.3% of the PGs (Costes et al., 2015). The results of this study are also limited by the self-report nature of suicidal ideation and suicide attempts as they may be influenced by recall bias (Pokorny, 1993). Thus, a more precise classification of suicidality may better distinguish the groups. Furthermore, we did not differentiate the level of the suicidal risk between the groups (we did not consider the difference between suicide ideation and/or history of suicide attempts). Additionally, larger sample sizes may be necessary to evaluate suicidality in these dimensions in pathological gamblers. We did not use a non-gamblers control group in this study. For future investigations, we will be careful to constitute a control group. However, we think that these limitations are compensated for by the strength of the study, mainly, the standardized multidimensional assessment used. Our work is original and provides new results regarding the management of PGs at risk of suicide based on the three predictors identified in this study.

5. Conclusion

We found an exceptionally high level of suicidal risk among the patients in our study, with more than four out of 10 meeting the criteria for suicidal risk. Thus, suicidality is a significant and legitimate clinical concern for disordered gamblers. We identified a multivariate model of suicidal risk in PGs seeking treatment. Although clinicians cannot reliably predict low base-rate phenomena such as suicide (Petry and Kiluk, 2002), an awareness of the risk factors may assist in preventing future suicide attempts in gamblers seeking treatment. Accordingly, it is necessary to assess the three relevant predictors, specifically, the association with a history of major depression or anxiety disorders and the perceived inability to stop gambling.

The perspectives that arise from this work have several dimensions. First, with the objective being universal prevention, it would be beneficial to provide the general population with more information regarding the risks linked to gambling, especially the risk related to suicide. Second, when a gambling problem first begins to manifest, one must take action to prevent the problem

from becoming more deeply rooted, to avoid the harmful consequences associated with gambling problems and to assess the potential risks of suicide. Third, as presented herein, gamblers at risk of suicide tend to have a history of major depression and anxiety disorders and tend to have a perceived inability to stop gambling. Therefore, it is suggested that therapy designed for PGs should aim at increasing the self-efficacy and self-confidence of the PG and giving him/her individual strategies to enact changes in his/her life.

References

APA, 1994. Diagnostic and Statistical Manual of Mental Disorders, 4th ed. Washington DC, USA.

APA, 2013. Diagnostic and Statistical Manual of Mental Disorders, fifth edition. Washington, DC, USA.

Aymamí, N., Jiménez-Murcia, S., Granero, R., Ramos-Quiroga, J.A., Fernández-Aranda, F., Claes, L., Sauvaget, A., Grall-Bronnec, M., Gómez-Peña, M., Savvidou, L. G., Fagundo, A.B., Del Pino-Gutierrez, A., Moragas, L., Casas, M., Penelo, E., Menchón, J.M., 2015. Clinical, psychopathological, and personality characteristics associated with ADHD among individuals seeking treatment for gambling disorder. BioMed. Res. Int. 2015, 965303.

Billieux, J., Van der Linden, M., Khazaal, Y., Zullino, D., Clark, L., 2012. Trait gambling cognitions predict near-miss experiences and persistence in laboratory slot machine gambling. Br. J. Psychol. (London, England: 1953) 103 (3), 412–427.

Bischof, A., Meyer, C., Bischof, G., John, U., Wurst, F.M., Thon, N., Lucht, M., Grabe, H. J., Rumpf, H.J., 2015. Suicidal events among pathological gamblers: the role of comorbidity of axis I and axis II disorders. Psychiatry Res. 225 (3), 413–419.

Blaszczynski, A., Farrell, E., 1998. A case series of 44 completed gambling-related suicides. J. Gambl. Stud.: Co.-Spons. Natl. Counc. Probl. Gambl. Inst. Study Gambl. Commer. Gaming 14 (2), 93–109.

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

Blaszczynski, A.P., Wilson, A.C., McConaghy, N., 1986. Sensation seeking and pathological gambling. Br. J. Addict. 81 (1), 113–117.

Bond, M., 2004. Empirical studies of defense style: relationships with psychopathology and change. Harv. Rev. Psychiatry 12 (5), 263–278.

Caci, H.M., Bouchez, J., Baylé, F.J., 2010. An aid for diagnosing attention-deficit/hyperactivity disorder at adulthood: psychometric properties of the French versions of two Wender Utah Rating Scales (WURS-25 and WURS-K). Compr. Psychiatry 51 (3), 325–331.

Calati, R., Oasi, O., De Ronchi, D., Serretti, A., 2010. The use of the defence style questionnaire in major depressive and panic disorders: a comprehensive meta-analysis. Psychol. Psychother. 83 (Pt 1), 1–13.

Calati, R., Giegling, I., Rujescu, D., Hartmann, A.M., Möller, H.-J., De Ronchi, D., Serretti, A., 2008. "Temperament and character of suicide attempters. J. Psychiatr. Res. 42 (11), 938–945.

Chakroun-Vinciguerra, N., Faytout, M., 2005. French validation of a short version of the Temperament and Character Inventory (TCI-125). J. Thér. Comport. Cogn. 15 (1), 27–33.

Cloninger, C., Svrakic, D.M., Przybeck, T.R., 1993. A psychobiological model of temperament and character. Arch. Gen. Psychiatry 50 (12), 975–990.

Conrad, A.K., Jacoby, A.M., Jobes, D.A., Lineberry, T.W., Shea, C.E., Arnold Ewing, T.D., Schmid, P.J., Ellenbecker, S.M., Lee, J.L., Fritsche, K., Grenell, J.A., Gehin, J.M., Kung, S., 2009. A psychometric investigation of the suicide status form II with a psychiatric inpatient sample. Suicide Life-Threat. Behav. 39 (3), 307–320.

Corruble, E., Bronnec, M., Falissard, B., Hardy, P., 2004. Defense styles in depressed suicide attempters. Psychiatry Clin. Neurosci. 58 (3), 285–288.

Costes, J.-M., Kairouz, S., Eroukmanoff, V., Monson, E., 2015. Gambling patterns and problems of gamblers on licensed and unlicensed sites in France. J. Gambl. Stud.: Co-Spons. Natl. Counc. Probl. Gambl. Inst. Study Gambl. Commer. Gaming.

Davtian, M., Reid, R.C., Fong, T.W., 2012. Investigating facets of personality in adult pathological gamblers with ADHD. Neuropsychiatry 2 (2), 163–174.

De Fruyt, F., Van De Wiele, L., Van Heeringen, C., 2000. Cloninger's psychobiological model of temperament and character and the five-factor model of personality. Personal. Individ. Differ. 29 (3), 441–452.

Derevensky, J.L., Pratt, L.M., Hardoon, K.K., Gupta, R., 2007. Gambling problems and features of attention deficit hyperactivity disorder among children and adolescents. J. Addict. Med. 1 (3), 165–172.

Ferreri, M., Vacher, J., Tawils, S., Alby, J.M., 1987. Facteurs événementiels et dépression: le questionnaire EVE, une nouvelle approche de méthodologie prédictive. Psychologie médicale. Paris, pp. 2441–2448.

Frank, M.L., Lester, D., Wexler, A., 1991. Suicidal behavior among members of gamblers anonymous. J. Gambl. Stud.: Co-Spons. Natl. Counc. Probl. Gambl. Inst. Study Gambl. Commer. Gaming 7 (3), 249–254.

Grall-Bronnec, M., Wainstein, L., Augy, J., Bouju, G., Feuillet, F., Vénisse, J.-L., Sébille-Rivain, V., 2011. Attention deficit hyperactivity disorder among pathological and at-risk gamblers seeking treatment: a hidden disorder. Eur. Addict. Res. 17 (5), 231–240.

Grall-Bronnec, M., Bouju, G., Sebille-Rivain, V., Gorwood, P., Boutin, C., Venisse, J.L.,

hardouin, J.B., 2012a. A French adaptation of the Gambling Related Cognitions Scale (GRCS): a useful tool for asssessement of irrational thoughts among gamblers. J. Gambl. Issues 21p..

Grall-Bronnec, M., Wainstein, L., Feuillet, F., Bouju, G., Rocher, B., Vénisse, J.-L., Sébille-Rivain, V., 2012b. Clinical profiles as a function of level and type of impulsivity in a sample group of at-risk and pathological gamblers seeking treatment. J. Gambl. Stud.: Co-Spons. Natl. Counc. Probl. Gambl. Inst. Study Gambl. Commer. Gaming 28 (2), 239–252.

Hodgins, D.C., Mansley, C., Thygesen, K., 2006. Risk factors for suicide ideation and attempts among pathological gamblers. Am. J. Addict.: Am. Acad. Psychiatr. Alcohol. Addict. 15 (4), 303–310.

Hollander, E., DeCaria, C.M., Mari, E., Wong, C.M., Mosovich, S., Grossman, R., Begaz, T., 1998. Short-term single-blind fluvoxamine treatment of pathological gambling. Am. J. Psychiatry 155 (12), 1781–1783.

Horodecki, I., 1992. The treatment model of the guidance center for gamblers and their relatives in Vienna/Austria. J. Gambl. Stud.: Co-Spons. Natl. Counc. Probl. Gambl. Inst. Study Gambl. Commer. Gaming 8 (2), 115–129.

Hosmer, D.W., Lemeshow, S., Sturdivant, R., 2013. Applied Logistic regression – Third edition NY.

Husky, M.M., Michel, G., Richard, J.-B., Guignard, R., Beck, F., 2015. Gender differences in the associations of gambling activities and suicidal behaviors with problem gambling in a nationally representative French sample. Addict. Behav. 45, 45–50.

Ibáñez, A., Blanco, C., Moreryra, P., Sáiz-Ruiz, J., 2003. Gender differences in pathological gambling. J. Clin. Psychiatry 64 (3), 295–301.

Ibáñez, A., Blanco, C., Donahue, E., Lesieur, H.R., Pérez de Castro, I., Fernández-Piqueras, J., Sáiz-Ruiz, J., 2001. Psychiatric comorbidity in pathological gamblers seeking treatment. Am. J. Psychiatry 158 (10), 1733–1735.

INSERM, C.E.C., 2008. Gambling: Contexts and Addictions. Institu National de la santé et de la recherche médicale, Paris.

Joormann, J., Gotlib, I.H., 2010. Emotion regulation in depression: relation to cognitive inhibition. Cogn. Emot. 24 (2), 281–298.

Kausch, O., 2003. Suicide attempts among veterans seeking treatment for pathological gambling. J. Clin. Psychiatry 64 (9), 1031–1038.

Lecrubier, Y., Sheehan, D.V., Weiller, E., Amorim, P., Bonora, I., Harnett Sheehan, K., Janavs, J., Dunbar, G.C., 1997. The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: reliability and validity according to the CIDI. Eur. Psychiatry 12 (5), 224–231.

Ledgerwood, D.M., Petry, N.M., 2004. Gambling and suicidality in treatment-seeking pathological gamblers. J. Nerv. Ment. Dis. 192 (10), 711–714.

Ledgerwood, D.M., Steinberg, M.A., Wu, R., Potenza, M.N., 2005. Self-reported gambling-related suicidality among gambling helpline callers. Psychol. Addict. Behav.: J. Soc. Psychol. Addict. Behav. 19 (2), 175–183.

Lesieur, H.R., Blume, S.B., 1990. Characteristics of pathological gamblers identified among patients on a psychiatric admissions service. Hosp. Community Psychiatry 41 (9), 1009–1012.

Lister, J.J., Milosevic, A., Ledgerwood, D.M., 2015. Personality traits of problem gamblers with and without alcohol dependence. Addict. Behav. 47, 48–54.

Maccallum, F., Blaszczynski, A., 2003. Pathological gambling and suicidality: an analysis of severity and lethality. Suicide Life-Threat. Behav. 33 (1), 88–98.

McCormick, R.A., Russo, A.M., Ramirez, L.F., Taber, J.I., 1984. Affective disorders among pathological gamblers seeking treatment. Am. J. Psychiatry 141 (2), 215–218.

McFeeters, D., Boyda, D., O'Neill, S., 2015. Patterns of stressful life events: distinguishing suicide ideators from suicide attempters. J. Affect. Disord. 175, 192–198.

Meltzer, H., Bebbington, P., Brugha, T., Jenkins, R., McManus, S., Dennis, M.S., 2011. Personal debt and suicidal ideation. Psychol. Med. 41 (4), 771–778.

Moghaddam, J.F., Yoon, G., Dickerson, D.L., Kim, S.W., Westermeyer, J., 2015b. Suicidal ideation and suicide attempts in five groups with different severities of gambling: findings from the National Epidemiologic Survey on alcohol and related conditions. Am. J. Addict. 24 (4), 292–298.

Moran, J., 1969. Taking the final risk. Ment. Health, 21–22.

Newman, S.C., Thompson, A.H., 2003. A population-based study of the association between pathological gambling and attempted suicide. Suicide Life-Threat. Behav. 33 (1), 80–87.

Perroud, N., Baud, P., Mouthon, D., Courtet, P., Malafosse, A., 2011. Impulsivity, aggression and suicidal behavior in unipolar and bipolar disorders. J. Affect. Disord. 134 (1–3), 112–118.

Perroud, N., Baud, P., Ardu, S., Krejci, I., Mouthon, D., Vessaz, M., Guillaume, S., Jaussent, I., Olié, E., Malafosse, A., Courtet, P., 2013. Temperament personality profiles in suicidal behaviour: an investigation of associated demographic, clinical and genetic factors. J. Affect. Disord. 146 (2), 246–253.

Petry, N.M., Kiluk, B.D., 2002. Suicidal ideation and suicide attempts in treatment-seeking pathological gamblers. J. Nerv. Ment. Dis. 190 (7), 462–469.

Petry, N.M., Steinberg, K.L., Women's Problem Gambling Research, C., 2005a. Childhood maltreatment in male and female treatment-seeking pathological gamblers. Psychol. Addict. Behav.: J. Soc. Psychol. Addict. Behav. 19 (2), 226–229.

Petry, N.M., Stinson, F.S., Grant, B.F., 2005b. Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: results from the National Epidemiologic Survey on alcohol and related conditions. J. Clin. Psychiatry 66 (5), 564–574.

Pokorny, A.D., 1993. Suicide prediction revisited. Suicide Life-Threat. Behav. 23 (1), 1–10.

Potenza, M.N., Steinberg, M.A., McLaughlin, S.D., Wu, R., Rounsaville, B.J., O'Malley,

S.S., 2001. Gender-related differences in the characteristics of problem gamblers using a gambling helpline. Am. J. Psychiatry 158 (9), 1500–1505.

Preuss, U.W., Schuckit, M.A., Smith, T.L., Danko, G.R., Dasher, A.C., Hesselbrock, M.N., Hesselbrock, V.M., Nurnberger, J.I., 2002. A comparison of alcohol-induced and independent depression in alcoholics with histories of suicide attempts. J. Stud. Alcohol 63 (4), 498–502.

Quigley, L., Yakovenko, I., Hodgins, D.C., Dobson, K.S., El-Guebaly, N., Casey, D.M., Currie, S.R., Smith, G.J., Williams, R.J., Schopflocher, D.P., 2014. Comorbid problem gambling and major depression in a community sample. J. Gambl. Stud.: Co-Spons. Natl. Counc. Probl. Gambl. Inst. Study Gambl. Commer. Gaming.

Raylu, N., Oei, T.P.S., 2004. The Gambling Related Cognitions Scale (GRCS): development, confirmatory factor validation and psychometric properties. Addiction 99 (6), 757–769.

Roy, A., 2009. Characteristics of cocaine dependent patients who attempt suicide. Arch. Suicide Res.: Off. J. Int. Acad. Suicide Res. 13 (1), 46–51.

Shaffer, H.J., Hall, M.N., 2001. Updating and refining prevalence estimates of disordered gambling behaviour in the United States and Canada. Can. J. Public Health: Rev. Can. St. Publique 92 (3), 168–172.

Sheehan, D.V., Lecrubier, Y., Sheehan, K.H., Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., Dunbar, G.C., 1998. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. J Clin Psychiatry 59 (Suppl. 20), 22–33.

Sinclair, H., Pasche, S., Pretorius, A., Stein, D.J., 2014. Clinical profile and psychiatric comorbidity of treatment-seeking individuals with pathological gambling in South-Africa. J. Gambl. Stud.: Co-Spons. Natl. Counc. Probl. Gambl. Inst. Study Gambl. Commer. Gaming.

Sullivan, S., Abbott, M., McAvoy, B., Arroll, B., 1994. Pathological gamblers—will they use a new telephone hotline? NZ Med. J. 107 (983), 313–315.

Thon, N., Preuss, U.W., Pölzleitner, A., Quantschnig, B., Scholz, H., Kühberger, A., Bischof, A., Rumpf, H.J., Wurst, F.M., Austrian Society for the research of non-substance related, A., 2014. Prevalence of suicide attempts in pathological gamblers in a nationwide Austrian treatment sample. Gen. Hosp. Psychiatry 36 (3), 342–346.

Toce-Gerstein, M., Gerstein, D.R., Volberg, R.A., 2003. A hierarchy of gambling disorders in the community. Addiction 98 (12), 1661–1672.

Van der Linden, M., d'Acremont, M., Zermatten, A., Jermann, F., Larøi, F., Willems, S., Juillerat, A.-C., Bechara, A., 2006. A French adaptation of the UPPS impulsive behavior scale. Eur. J. Psychol. Assess. 22 (1), 38–42.

Ward, M.F., Wender, P.H., Reimherr, F.W., 1993. The Wender Utah Rating Scale: an aid in the retrospective diagnosis of childhood attention deficit hyperactivity disorder. Am. J. Psychiatry 150 (6), 885–890.

Welte, J.W., Barnes, G.M., Wieczorek, W.F., Tidwell, M.-C.O., Parker, J.C., 2004. Risk factors for pathological gambling. Addict. Behav. 29 (2), 323–335.

Whiteside, S.P., Lynam, D.R., Miller, J.D., Reynolds, S.K., 2005. Validation of the UPPS impulsive behaviour scale: a four-factor model of impulsivity. Eur. J. Personal. 19 (7), 559–574.

Wilcox, H.C., Conner, K.R., Caine, E.D., 2004. Association of alcohol and drug use disorders and completed suicide: an empirical review of cohort studies. Drug Alcohol Depend. 76, Suppl.: S11–S19.

Wong, P.W.C., Chan, W.S.C., Conwell, Y., Conner, K.R., Yip, P.S.F., 2010. A psychological autopsy study of pathological gamblers who died by suicide. J. Affect. Disord. 120 (1–3), 213–216.

Wood, R.T.A., Griffiths, M.D., 2007. A qualitative investigation of problem gambling as an escape-based coping strategy. Psychol. Psychother. 80 (Pt 1), 107–125.

Yuodelis-Flores, C., Ries, R.K., 2015. Addiction and suicide: a review. Am. J. Addict.: Am. Acad. Psychiatr. Alcohol. Addict. 24 (2), 98–104.