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Internet gambling in relation to Internet addiction, substance use, online sexual engagement and suicidality in a Greek sample

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ABSTRACT

Research has found gambling to be related to a variety of other addictive behaviours. The study objective was to evaluate the association of Internet gambling with Internet addiction, online sexual engagement, suicidality and substance use, in a sample of Greek adults. The study sample consisted of 789 military personnel. During their annual medical examination the study participants anonymously completed a series of self-reported questionnaires in relation to socio-demographic data, Internet gambling practices, online sexual engagement, Internet addiction, suicidality and psychoactive substance use. We found that Internet addiction significantly predicted engagement with online gambling, followed by substance use in general, and, in particular, the use of cocaine or heroin. Finally, two other predictive indicators were self-reported suicide attempts and engagement with online sex. Online gambling is associated with various behaviours related to impulsivity such as Internet addiction, online sexual engagement, suicidality and substance use. Future research will increase our knowledge on the contribution of new technologies and the Internet in Internet gambling dimensions, as well as on the associations with other high-risk behaviours such as substance use, pornography and suicidality.

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Internet gambling; Internet addiction; cyber-sexual engagement; suicidality; substance abuse; military personnel

Introduction

Technology plays a critical role in the development of increased gambling opportunities (Blaszczynski & Nower, 2002; Blaszczynski, Russell, Gainsbury, & Hing, 2016; Gainsbury et al., 2014, 2015a; King, Delfabbro, & Griffiths, 2010; McCormack, Shorter, & Griffiths, 2013). The Internet in particular allows both readily accessible and unlimited opportunities for individuals to gamble (Delfabbro, Lahn, & Grabosky, 2006; Gainsbury et al., 2015b). Internet gambling in Greece is a relatively under-researched area, which is surprising given the size of the market in the country. Cyber poker players from Greece reportedly gambled

20.54 billion \$ in 2010 alone, ranking Greece the 14th country in the EU by value of gross sum (Fiedler & Wilcke, 2012). At the same time there were an estimated 47,000 active (within the previous 6 months) poker players in a population of 4.97 million Internet users (close to 1%; Fiedler & Wilcke, 2012). A recent study among Greek adolescents showed that the prevalence of Internet gambling behaviours was 4% (Floros, Siomos, Fisoun, & Geroukalis, 2013). In another random sample of Greek adolescents, the prevalence of engagement with Internet gaming and/or gambling behaviours was about 15%, and these adolescents were more likely to concomitantly present with Internet Addiction (Tsitsika, Critselis, Janikian, Kormas, & Kafetzis, 2010).

There is no consensus among researchers as to how to define Internet addiction, as to whether it is a discrete disorder or part of a broader disorder, nor over whether it should be classed as an addiction or an impulse-control disorder (Winkler et al., 2013). Furthermore it is not clear if 'Internet addiction' is a single condition or whether the Internet is simply the common medium for a variety of behaviours like gaming, social networking or pornography to find expression (Winkler et al., 2013). Young's (1998a, 1998b) classic discussion suggested six dimensions to Internet addiction. These were (a) the salience of the Internet in the person's life and the loss of interest in other activities; (b) the excessive amount of energy and time spent online; (c) constant craving for Internet use – that is, thinking about being online when away from the computer; (d) the negative impact on the person's work and productivity; (e) the negative impact on his or her social life; and (f) the lack of control involved. These impulsivity, emotional, cognitive, social and professional dimensions are shared in common with gambling disorder, as reflected in the presently accepted diagnostic criteria for this condition (American Psychiatric Association, 2013). Indeed, most of the recently developed diagnostic scales of Internet addiction that are used in research have been adapted from the *Diagnostic and Statistical Manual's* (DSM) diagnostic criteria for gambling disorder (Byun, Ruffini, Mills, et al., 2009).

Findings from the US army showed that a small but significant percentage of military personnel suffer with gambling disorder (Bray et al., 2003; Steenbergh, Whelan, Meyers, Klesges, & DeBon, 2008). Surveys of active military personnel have revealed that between 6.3% and 8.1% of service personnel report experiencing at least one gambling-related problem in their lifetime (Bray et al., 2003; Bray, Sanchez, Ornstein, Lentine, & Vincus, 1999). Moreover, 1.2% of those surveyed could be classified as suffering from gambling disorder sometime in their lives (Bray, Hourani, Rae Olmstead, et al., 2006). Military personnel are predominantly young males, a demographic group at high risk for gambling disorder (Johansson, Grant, Kim, Odlaug, & Götestam, 2009). According to Bray et al. (1999), military personnel have relatively higher rates of risk-taking and sensation-seeking, two constructs associated with gambling disorder (Vitaro, Arseneault, & Tremblay, 1999).

Gambling disorder is co-morbid with antisocial personality disorder, depressive and bipolar disorders, and other substance use disorders, particularly with alcohol disorders (Braverman & Shaffer, 2012; Grant, Potenza, Weinstein, & Gorelick, 2010; Petry & Kiluk, 2002; Shaffer & Korn, 2002; Winstanley, 2011). Compared to healthy controls, gambling disorder sufferers tend to be more inflexible, prone to low-probability reward, and they discount delayed rewards more steeply (Wiehler & Peters, 2014). Distortions of thinking, such as superstitions, denial, a sense of power and control over the outcome of chance events, and overconfidence are also usually present (Fortune & Goodie, 2012). Gambling disorders may occur prior to the onset of other mental disorders, especially anxiety disorders and substance

use disorders (Hodgins, Stea, & Grant, 2011). Risk factors to relapse are the occurrence of a major depressive episode, living alone, unemployment and pre-existing medical problems, as well as impulsivity and loss of control (Battersby, Tolchard, Scurrah, & Thomas, 2006). Almost half of individuals with gambling disorder have co-morbid substance and/or alcohol abuse (Black & Moyer, 1998). According to several studies the army is associated with both substance abuse and gambling involvement (Daghestani, Elenz, & Crayton, 1996; Kennedy, Cook, Poole, Brunson, & Jones, 2005; Roy, Smelson, & Lindeken, 1996).

Several studies show an association between suicidal ideation or suicidal behaviour and gambling disorder (Battersby et al., 2006; Hodgins, Mansley, & Thygesen, 2006; Petry & Kiluk, 2002). Across various studies that employ a number of methodologies, the comorbidity between substance abuse and suicidal behaviour ranges from 7.5% to 64%, while subjects diagnosed with both alcohol abuse and gambling are more likely to experience suicidal ideation (Battersby et al., 2006). A Canadian study found that the risk of suicide is four times higher among individuals with gambling disorder (Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998). Research has also shown that up to half of individuals in treatment for gambling disorder report suicidal ideation, and about 17% have attempted suicide (Hodgin et al., 2006).

There is also a connection between Internet gambling and pathological sexual behaviour (Blaszczynski & Nower, 2002; Shaffer & Korn, 2002). A recent study in Greece showed that viewing of online pornography predicted the frequency of engagement with Internet gambling (Floros et al., 2013). The objective of the present exploratory study was to evaluate the association of Internet gambling with suicidality, substance use, online sexual engagement, and Internet addiction in a sample of Greek adults. The latent construct underlying these variables is impulsiveness (Lacey & Evans, 1986; Potenza & Hollander, 2002). Due to the multidimensional nature of impulsive behaviours it was, however, deemed preferable to separately measure certain diverse aspects of impulsiveness rather than administer one global scale.

Methods

Study design and study population

A cross-sectional study was conducted in the second trimester of 2013 in Athens, Greece. A total of 883 military personnel were asked to participate anonymously in the study, completing a series of self-reported questionnaires during their annual medical examination. Of the 883 total participants, 810 did not have missing values in the data-set of socio-demographic data. After controlling for outliers with anomaly detection techniques, 17 cases were excluded and the final sample that was analysed consisted of $N = 789$ military personnel (89% men, mean age 32.3 ± 8.33). With regard to educational level, 242 participants (30.7%) were secondary school graduates, 479 (60.7%) attended higher education (tertiary) and 68 (8.6%) had a postgraduate or doctoral specialization. With regard to relationship status, 300 respondents (38%) were married, 10 (1.3%) were divorced, 280 (35.5%) were in a relationship without being married and the remaining 199 (25.2%) were single. The Greek army is a conscription army with a mandatory nine-month service for all able-bodied adult males, but the backbone of the army consists of professional men and women who serve for a minimum of five years, and usually lifelong. Accordingly, 106 (13.4%) of our study participants were students in military academies, 612 (77.6%) were permanent military personnel and 71 (9%) were conscripted soldiers carrying out their mandatory service.

Measurements

Participants completed a number of self-report questionnaires. With the exception of the Internet Addiction Test (IAT), subscales of Internet gambling practices, online sexual engagement, suicidal ideation and psychoactive substance use (see below) were ad hoc scales that we created specifically for this study, with core items that were selected from other formal scales. Given the exploratory nature of this study and large number of variables involved, we felt it was necessary to keep the number of questionnaire items to a manageable size so as to avoid respondent fatigue and encourage completion; for this reason we avoided the use of full scales for most of the variables.

The self-report questionnaires (all administered in Greek) covered the preceding 12 months: (1) Socio-demographic data; (2) Internet gambling practices, consisting of 4 items (Cronbach's alpha = 0.71, see Table 1). These 4 binary items were summed to compute the index of Internet gambling; (3) Online sexual engagement (Weiss, 1997), consisting of 4 binary items (Cronbach's alpha = 0.67, see Table 1). These were summed to compute the index of online sexual engagement; (4) Suicidal ideation and/or behaviour, consisting of 5 items (adapted from Hamilton, 1960; Paykel, Myers, Lindenthal, & Tanner, 1974; Cronbach's alpha = 0.76, see Table 1). These were summed to compute the index of suicidality; (5) Psychoactive substance use during the last year, consisting of 4 items (see Table 1) (Giotakos, 2003); (6) the IAT (Internet Addiction Test) was translated in Greek and used to evaluate the presence of Internet addictive behaviour among study participants (Young, 1998a). The IAT evaluates the degree of preoccupation, compulsive use, behavioural problems, emotional changes, and impact upon functionality arising from accessing the Internet.

Table 1. Items, percentages, standardized Cronbach's alpha for the following: Internet gambling, online-sexual engagement, suicidality, substance use and Internet addiction.

Internet gambling (items)	Cronbach's alpha = 0.71
1. I have bet money on gambling games online (adapted from Volberg, 2002)	N = 95, 12.0%
2. I feel the need to bet increasing amounts of money online (Ferris & Wynne, 2001)	N = 20, 2.5%
3. I have made efforts to reduce or stop online gambling (Baron, Dickerson, & Blaszczyński, 1995; Lesieur & Blume, 1987)	N = 53, 6.8%
4. I bet or win up to 100 euros monthly through online gambling	N = 32, 4.1%
Online sexual engagement (items)	Cronbach's alpha = 0.67
1. I visit websites with sexual content	N = 86, 10.9%
2. I have an impulse urge to reconnect for sexual satisfaction	N = 35, 4.4%
3. Cyber-sex ends to phone sex or sex with a real partner	N = 29, 3.7%
4. I consider online sex one of the best ways of sexual satisfaction	N = 25, 3.2%
Suicidality (items)	Cronbach's alpha = 0.76
1. My life is not meaningful	N = 39, 4.9%
2. I am contemplating suicide	N = 29, 3.7%
3. I sometimes think about suicide	N = 27, 3.4%
4. I have already attempted suicide	N = 10, 1.3%
5. I visit suicide-related websites	N = 8, 1.0%
Internet addiction (categories)	Cronbach's alpha = 0.963
1. At risk for Internet addiction	N = 49, 6.4%
2. Internet addiction	N = 3, 0.4%
Substance use (items)	
1. I occasionally use substances	N = 45, 5.7%
2. I abuse alcohol	N = 27, 3.4%
3. I use cannabis	N = 14, 1.8%
4. I use heroin or cocaine	N = 8, 1.0%

It consists of 20 Likert scaled items providing calibrated scores ranging from 1 ('rarely') to 5 ('always'). The sum of scores may thus range between 20 and 100, where higher scores (>40) reflect a greater tendency for problematic Internet use. From the IAT score the respondent will fall into one of the following categories: (1) normal Internet use: IAT scores 20–49; (2) at risk of addictive Internet use: IAT scores 50–79; and (3) Internet addictive behaviour: IAT scores 80–100 (Young, 1998a). The test showed high reliability (Cronbach's alpha = 0.93).

A stepwise multiple regression analysis was conducted to investigate predictors variables for engagement with online gambling. Stepwise multiple regression was used in this exploratory study to ensure only relevant variables entered the final model. The examined indicators were suicidal ideation; online sexual engagement; Internet addiction; reported suicide attempt; alcohol abuse; and cannabis, heroin or cocaine substances.

Ethics

The study protocol was approved by the Ethics Committee of the Medical Division of the Hellenic Army. Participation in the study was entirely optional and no reward was offered. Informed consent was obtained from all participants.

Results

With regard to demographics variables, a rather weak but statistically significant negative correlation between Internet gambling and age ($r = -0.12$, $p = .001$) was detected. A significant sex difference was also identified, with men showing significantly higher levels of engagement with Internet gambling ($M = 0.52$, $SE = 0.981$) compared to women ($M = 0.06$, $SE = 0.234$), ($F(1,787) = 18.807$, $p = .001$). One-way analyses of variance showed that the educational level of the participants did not impact their engagement with Internet gambling ($F(2,786) = 0.25$, $p = .781$), nor did their relationship status (being in a relationship or not) ($F(1,787) = 0.005$, $p = .946$). Internal consistencies for the various subscales and percentages of positive responses for individual items are shown in Table 1.

Table 2 shows the results of a stepwise multiple regression with Internet gambling engagement as the dependent variable. The R^2 was equal to 0.21 and the *Adjusted R²* index was equal to 0.20. We found that Internet addiction significantly predicted engagement with Internet gambling ($\beta = 0.26$, $p = .001$, $\Delta R^2 = 0.103$), followed by substance use in general

Table 2. Regression coefficients for the prediction of Internet gambling by online sexual engagement, suicidal ideation, substance use and Internet addiction.

	Internet gambling	
	Stepwise (ΔR^2)	β final
Self-reported use of alcohol	–	–
Self-reported use of cannabis	–	–
Indicator of suicidal ideation	–	–
Internet addiction	1 (0.103)	0.23***
Self-reported substance use	2 (0.058)	0.17***
Self-reported use of heroin or cocaine	3 (0.032)	0.12**
Self-reported suicidal attempt	4 (0.009)	0.12**
Cyber-sexual engagement	5 (0.004)	0.08*
Total R^2		0.21
$F(5,778) = 40.71$, $p = .001$		

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

($\beta = 0.17$, $p = .001$, $\Delta R^2 = 0.058$) and, especially, the use of cocaine or heroin ($\beta = 0.12$, $p = .003$, $\Delta R^2 = 0.032$). Finally, two other significant predictors were self-reported suicide attempts, ($\beta = 0.12$, $p = .004$, $\Delta R^2 = 0.009$) and engagement with online sex ($\beta = 0.08$, $p = .040$, $\Delta R^2 = 0.004$) (Table 2).

Discussion

The present study constitutes a preliminary examination of online gambling behaviour in a Greek sample and its relationship with several impulse control behaviours. We found a significant covariance between online gambling behaviours and Internet addiction. It should be noted, however, that while 12% of the sample gambled online, only 0.4% suffered from Internet addiction.

Moreover, we found an association between gambling behaviours and substance use. These results are in agreement with previous studies that found gambling to be associated with periods of stress or depression, as well as with periods of substance use or abstinence (Braverman & Shaffer, 2012; Grant et al., 2010). It is thought that the dopamine mediated reward system underpins substance abuse and it is possible that the same neural substrate mediates gambling. In line with this is the finding that dopaminergic medication (e.g. for Parkinson's disease) may increase urges to gamble (Rosa et al., 2013). One of the most interesting findings in the study by Goldstein and Volkow (2011) was the strong involvement of the putamen. This brain structure is known to modulate several neurotransmitters including dopamine, and blunted striatal dopaminergic function has been strongly implicated as one of the key biological mechanisms of addiction disorders.

In addition, we found a significant association between online gambling and suicidal behaviour, but, contrary to our expectations, no association between Internet gambling and alcohol abuse was found in this study (though it should be noted that for alcohol abuse only a binary yes/no response was collected from each participant). Several studies in the literature identify links between substance use, alcohol abuse and involvement with gambling (Black & Moyer, 1998; Braverman & Shaffer, 2012; Grant et al., 2010; Lloyd et al., 2010; Pallanti, Bernardi, & Quercioli, 2006; Shaffer & Korn, 2002; Winstanley, 2011). However, it is worth noting that gambling in other contexts (e.g. casinos, racetracks and other large public venues) may be more conducive to alcohol consumption, as compared to the solitary experience of the Internet gambler who gambles alone at home.

It should be noted that the DSM-5 included 'Internet Addiction' in an appendix, and not in the main body of the addictive disorders. This appears to be a fairly balanced and cautious approach, which can hopefully give rise to more meaningful research in this important but controversial area. In the chapter 'Conditions for Further Study', the DSM-5 describes 'Internet Gaming Disorder' with nine proposed criteria, indicating 'only non-gambling Internet games are included in this disorder' (American Psychiatric Association, 2013, p. 796). Additionally, 'Gambling Disorder' is recommended as a 'Non-Substance-Related Disorder', without making reference to any contribution of the new technologies or the Internet. Future research is necessary to increase our knowledge on the prevalence of Internet gambling, as well as its association with high-risk behaviours, such as substance use, pornography and suicidality.

With regard to the limitations of the present study, it must be acknowledged that the cross-sectional design employed here is not well suited for an examination of the

temporal sequence and causal interaction of variables. In addition, the study only examined online gambling, not land-based gambling or gambling disorder in general, and this was measured using a brief, non-standardized scale. Due to the self-reported assessment tools utilized, both a selection and reporting bias cannot be excluded. Finally, due to the lack of a gold standard for measuring addictive Internet behaviours, it is uncertain whether the observed high IAT rates are accurate or simply a reflection of elevated false-positive reporting rates. While military personnel are likely to provide truthful answers if they believe a survey will be used for legitimate purposes and individual answers will remain confidential (Warner et al., 2011), the presence or perception of mental illness stigma (Kim, Thomas, Wilk, Castro, & Hoge, 2010) and a bias against reporting embarrassing behaviours (Tourangeau & Yan, 2007) remain prevalent in the military. It is for this reason that special focus was placed by the researchers on assuring study participants that their answers would remain anonymous. Participants' sense of confidentiality was also improved by having civilian researchers administer the questionnaires in neutral locations without the presence of military medical personnel (see Savell, 1993). The small number of women in the current study, although reflective of the army population as a whole, is obviously not representative of the Greek adult population at large. Finally, the online sexual engagement index presented low but acceptable Cronbach's alpha score. While the generally agreed upon limit for Cronbach's alpha is .70, this may decrease to .60 in exploratory research (Hair, Black, Babin, Anderson, & Tatham, 2006; Robinson, Shaver, & Wrightsman, 1991).

More sophisticated methods, like data mining, could be used in future studies that examine this area. According to Griffiths (1996), further work is needed to investigate which structural characteristics are more likely to affect 'addictiveness' potential in particular forms of gambling. The structural features of online gambling should be considered together with predisposing factors (i.e. motivation, attitudes, social factors), which will be key factors for middle and high engagement with Internet and conventional gambling. It would be of vital importance to co-examine latent types of gambling (e.g. dealing with the stock market) and their interaction with online and conventional gambling practices.

In closing, the present study highlights the need for planning and implementation of online gambling prevention programmes in the Greek army. Given that Greek army personnel are scattered throughout the country, and especially in remote border areas, prevention facilities and programmes should be web-based or telephone-based. The Greek army already offers a 24-hour 'psychological support helpline' that is manned by psychiatrists, psychologists, social workers and sociologists. This could serve as the backbone for a more dedicated programme that would also be accessible online. Rodda, Lubman, Dowling, Bough, and Jackson's (2013) discussion of web-based gambling counselling highlights several advantages of this approach that would be of particular relevance to potential Greek army personnel users. Most important among these are confidentiality, anonymity, convenience and accessibility.

Conflict of interests

The authors report no conflicts of interest.

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Competing interests

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Constraints on publishing

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