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Predictors of Gaming Behavior among Military Peacekeepers – Exploring the Role of Boredom and Loneliness in Relation to Gaming Problems

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Abstract: The aim of the current study was to explore gaming problems in post-deployment veterans and to investigate whether boredom and loneliness can predict levels of gaming problems. The general well-being of veterans post their deployments to war zones is linked to an array of negative health consequences, and veterans may be at risk for developing gaming problems after homecomings. Problems that may be related to engagement in gaming include coping with negative emotions, such as boredom and loneliness, which are often faced by homecoming veterans as well. The sample in this study comprised Afghanistan veterans (N = 246), with a mean age of 37.5 years (standard deviation = 9.6 years), and 8.8% of the veterans showed symptoms indicative of problem gaming. This is not higher than that found in the general adult population in Norway. Logistic regression analyses showed that boredom proneness (lack of internal stimulation) and enhancement motivation were independent significant predictors of gaming problems, after controlling for age, gender, coping motivation, social motivation, anxiety, depression, loneliness, lack of external stimulation, hazardous drinking, and combat exposure. These factors accounted for as much as 65.8% of the variance in gaming problem status. We conclude that veterans who are highly motivated by enhancement motives and score low on lack of internal stimulation may be prone to developing gaming problems.

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1 Introduction

Deployments pose unique and often stressful situations to military personnel (Wells et al. 2010). A recent prevalence study of mental illness among veterans (peacekeepers) of the Norwegian United Nations Interim Force in Lebanon showed that the mental health condition of the veterans was generally good, with prevalence of mental illness being lower than, or comparable to, that in the general population (Gjerstad et al. 2016). Although many veterans are able to construe positive meaning from war and peacekeeping experiences (Schok et al. 2008), mental health problems are still prevalent in combat veterans after returning home from service, especially drinking problems and symptoms of posttraumatic stress disorder (PTSD) (Brief et al. 2013). Returning from war to a normal life may be difficult and predispose veterans to both boredom and loneliness (Mæland and Brunstad 2009; Shay 2002), which may in turn put veterans at risk for developing addictive behaviors (Shay 2002). Alcohol misuse following deployment has been reported in 12%–36% of veterans in the US (Burnett-Zeigler et al. 2011; Hoge et al. 2004; Milliken et al. 2007; Wilk et al. 2010). Although excessive drinking after homecoming has been documented in a wide range of studies (e.g., Burnett-Zeigler et al. 2011; Hoge et al. 2004; Wilk et al. 2010), few, if any, studies have investigated the relationship between homecoming and other addictions.

Gaming addiction can be defined as "excessive and compulsive use of computer or videogames that result in social and/or emotional problems; despite these problems, the gamer is unable to control this excessive use" (Lemmens et al. 2009, p. 78). Prevalence rates of video game addiction have been estimated to be between 2% and 8.5% (Gentile 2009; Lemmens et al. 2009;

Rehbein et al. 2010; Wenzel et al. 2009), and younger males are heavily overrepresented among individuals with gaming problems (Lemmens et al. 2009; Rehbein et al. 2010).

There are several reasons to believe that veterans may be at risk for developing gaming problems. First, deployments with combat exposure have been found to increase the risk for subsequent depression (Wells et al. 2010), and increased rates of depressive symptoms have also been reported among addictive gamers (Allison et al. 2006; Lemmens et al. 2009; Mentzoni et al. 2011). Loneliness is also prevalent among veterans after homecoming (Kuwert et al. 2014; Stein and Tuval-Mashiach 2015) and has also been identified as a predictor of subsequent gaming addiction (Lemmens et al. 2011; Seay and Kraut 2007) as well as being a consequence of gaming addiction (Lemmens et al. 2011). Depressive states, affect dysregulation, and dissociation have been found to correlate with gaming addiction, and it has been suggested that addicted persons build up a parallel and more favorable reality through dissociation, which serves the purpose of modulating unbearable and traumatic affective states (Caretti and Craparo 2009). Combat veterans may consequently engage in gaming as a means of coping with their life situation after homecoming and to escape from depression, loneliness, or an unpleasant reality/situation after completion of service.

Second, the predominant characteristics of combat unit volunteers are male gender and relatively young age, which are also identified as particular risk factors for developing gaming problems (Lemmens et al. 2009; Rehbein et al. 2010). A study from the US found that 40% of Military Academy cadets reported moderate-to-heavy game playing (Orvis et al. 2009). However, another study reported that the frequency of video game use was lower among soldiers compared to that in the general population and suggested that cadets may be a special population (Orvis et al. 2010).

Third, sensation seeking has been found to be related to risk-taking behavior, and high levels of sensation seeking have been found in both addicted online gamers (Mehroof and Griffiths 2010) as well as among volunteers for combat units (Hobfoll et al. 1989; Jobe et al. 1983). It has been suggested that sensation seeking provides a coping mechanism for overcoming boredom, and that online gaming provides psychological and physiological stimulation that is rewarding for sensation seekers (Mehroof and Griffiths 2010). For combat veterans, the contrast between active duty and homecoming may be considerable, and veterans often experience boredom after returning home (Mæland and Brunstad 2009; Shay 2002). Veterans with high needs for sensation seeking may consequently engage in gaming as a way of fulfilling their need for action/excitement as well as to cope with potential boredom and loneliness after homecoming. Previously, greater levels of boredom among veterans have been linked to tobacco use (McClernon et al. 2013; Widome et al. 2011), risky drinking (McDevitt-Murphy et al. 2015), and drug abuse (Mintz et al. 1979), and it has been proposed that the experience of boredom motivates individuals to engage in these behaviors that raise the level of arousal in order to escape from the negative state of boredom (Blaszczynski and Nower 2002; Mercer and Eastwood 2010; Milosevic and Ledgerwood 2010).

There is a need to systematically assess the mental health of veterans who have served in military operations in order to deliver optimal mental health care to returning veterans (Hoge et al. 2004). To our knowledge, no previous studies have investigated gaming problems among veterans in particular or the factors associated with the development of gaming problems in veterans. Coping with negative emotions and escaping from real-life problems have been found to be strong predictors of problem gaming (Hussain and Griffiths 2009; King and Delfabbro 2009; Yee 2006), and boredom (Chiu et al. 2004; Myrseth et al. 2017) and loneliness (Kim et al. 2009; Myrseth et al. 2017; Qin et al. 2007) have particularly been associated with gaming addiction.

The aim of the current study was twofold. First, we wanted to assess the prevalence rates of problem gaming and gaming addiction in a sample of veterans. The second aim was to investigate whether levels of boredom and loneliness can predict gaming problems beyond already established risk factors, such as gender, age, anxiety, and depression.

2 Methods

2.1 Participants and procedure

The sample consisted of a representative sample of veterans from the Norwegian Armed Forces randomly selected from among those previously deployed to Afghanistan between 2001 and 2013. A postal questionnaire was distributed to 500 Afghanistan military peacekeepers who were given the option to either complete the questionnaire on paper and return it in the enclosed prepaid envelope or complete the questionnaire online. After 4 weeks, a postal reminder was sent to all those who had not yet returned the questionnaire. A total of 246 questionnaires were returned (188 were returned by postal mail and 58 were completed online). After subtracting 10 questionnaires

that were returned by the postal services due to incorrect addresses from the initial pool of 500, a response rate of 50.2% was achieved. The participants consisted of 225 men and 21 women, with a mean age of 37.5 years (standard deviation [SD] = 9.6 years).

2.2 Measures

The Gaming Addiction Scale (GAS) (Lemmens et al. 2009) is a seven-item questionnaire, which is based on the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) criteria for pathological gambling previously adapted by Griffiths (2005). The GAS includes one item for each of the seven core criteria/components of video game addiction (salience, tolerance, mood modification, withdrawal, relapse, conflict, and problems). Respondents indicate on a five-point Likert scale how often each problematic incident has occurred during the last 6 months (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often). The scale has shown good convergent validity (as indicated by strong correlations with weekly time spent gaming) and good criterion validity (as indicated by correlations with increased loneliness, greater aggression, lower life satisfaction, and lower social competence) (Lemmens et al. 2009). Cronbach's alpha for the GAS in the current study was 0.78.

Different approaches for classifying problem gaming and gaming addiction have been suggested. The most conservative approach has been to require that all seven criteria must be endorsed to be classified as an addicted gamer (Lemmens et al. 2009; Mentzoni et al. 2011). However, this strict approach is not in line with modern psychiatric nosology, where only a certain number of criteria must be endorsed (e.g., for gambling disorder, five of nine criteria must be endorsed; American Psychiatric Association 2013). Charlton and Danforth (2007) offered a less conservative approach, which has been adopted by many researchers (e.g., Brunborg et al. 2013; Wittek et al. 2016), in which gamers are categorized into four groups: respondents who endorse all four of the core criteria for addiction (relapse, withdrawal, conflict, and problems) are categorized as addicted gamers, whereas those who endorse two or three of the core addiction criteria are categorized as problem gamers, those who endorse all three peripheral criteria (salience, tolerance, and mood modification) but not more than one of the addiction criteria are categorized as highly engaged gamers, and the remaining are categorized as nonproblem gamers. Following Charlton and Danforth's (2007) classification, respondents in the current study were categorized into four groups based on responses to the GAS: addicted gamers (n = 0), problem gamers (n = 7), highly engaged gamers (n = 4), and nonproblem gamers (n = 114).

The Electronic Gaming Motives Questionnaire (EGMQ) (Myrseth et al., submitted for publication) is a version of the Gamblers Motives Questionnaire, adapted to measure the motivation for gaming. The EGMQ consists of three subscales (five items each): enhancement motivation (ENH), coping motivation (COP), and social motivation (SOC). Frequency of gaming for each of the 15 reasons is addressed on a four-point scale (1 = almost never/never, 2 = sometimes, 3 = often, and 4 = almost always). Cronbach's alpha for the EGMQ in the current study was 0.86, and it was 0.79, 0.70, and 0.68 for the three subscales ENH, COP, and SOC, respectively.

The Boredom Proneness Scale – Short Form (BPS-SF) (Vodanovich et al. 2005) measures the propensity to experience boredom. Boredom can be defined as "the unfulfilled desire for satisfying activity" (Mercer-Lynn et al. 2014, p. 122), and boredom proneness is viewed as a predisposition toward the tendency to experience boredom, with differences among individuals (Farmer and Sundberg 1986). The BPS-SF consists of two factors: lack of internal stimulation and lack of external stimulation. Respondents indicate on a seven-point Likert scale how well they agree (7) or disagree (1) to each of the 12 statements. The scoring of all items for the lack of internal stimulation subscale is reversed, so that high scores on both subscales indicate greater boredom (lack of external or internal stimulation). The BPS-SF has showed improved fit compared to the original BPS and has been found to be invariant across gender (Vodanovich et al. 2005). Cronbach's alpha for the BPS-SF in the current study was 0.49 and 0.66 for the subscales lack of internal stimulation and lack of external stimulation, respectively.

The Robert's University of California, Los Angeles (UCLA) Loneliness Scale (RULS-8) (Roberts et al. 1993) was used to measure loneliness, which was adapted from the 20-item UCLA Loneliness Scale. RULS-8 consists of eight items, where respondents indicate how well each item fits according to four response categories (never, seldom, sometimes, and often). Cronbach's alpha for the RULS-8 in this study was 0.69.

The Hopkins Symptom Checklist – 5 (SCL-5; Tambs and Moum 1993) is a short form of the Hopkins Check List (SCL-25; Hesbacher et al. 1980) used for measuring symptoms of depression and anxiety, and it has demonstrated high correlations ($r = 0.92$) with the original version (Tambs and Moum 1993). Cronbach's alpha for the SCL-5 in the current study was 0.74, and it was 0.59 and 0.69 for the subscales anxiety and depression, respectively.

The Alcohol Use Disorders Identification Test – Alcohol Consumption Questions (AUDIT-C; Bush et al. 1998) was included to measure the levels of alcohol consumption because excessive drinking has been reported among veterans. The AUDIT-C is a brief three-item alcohol screen used to identify hazardous drinking and alcohol use disorders. The AUDIT-C is a modified version of the ten-question AUDIT instrument. The total score on the AUDIT-C is in the range of 0–12, where a score of four or more is considered positive (optimal for identifying hazardous drinking or active alcohol use disorders) for men, while a score of three or more is considered positive for women.

The Combat Exposure Scale (CES) (Keane et al. 1989) is a measure of wartime stressors experienced by combatants and consists of seven items with five response categories for each item. The total score of the CES is in the range of 0–41, where a score of 0–8 indicates "light combat", 9–16 indicates "light-to-moderate combat", 17–24 indicates "moderate combat", 25–32 indicates "moderate-to-heavy combat", and 33–41 indicates "heavy combat". Veterans with PTSD have reported higher amounts of combat exposure. The instrument has demonstrated adequate psychometric properties (Keane et al. 1989), and the Cronbach's alpha in the current study was 0.85.

2.3 Statistical analyses

Data were analyzed using SPSS, version 22. Descriptive statistics were calculated in terms of distribution. Logistic regression analyses were performed to assess the impact of a number of factors on the likelihood that respondents would have problems with gaming. Nonproblem/problem gaming was defined by using the categories suggested by Charlton and Danforth (2007), where nonproblem gaming was defined as fulfilling the criteria for a normal gamer, and problem gaming was defined by collapsing the three categories addicted gamers, problem gamers, and highly engaged gamers.

Univariate logistic regression analyses were conducted to examine whether the different demographic variables (gender and age), gaming motives (coping, enhancement, and social motives), and psychosocial variables (anxiety, depression, boredom, loneliness, hazardous drinking, and combat exposure) separately were related to the dependent variable gaming problems. The predictor variables were then subsequently entered into adjusted (multivariate) analyses controlling for every other predictor variable. Results are presented as odds ratios (ORs) with 95% confidence intervals (CIs). An OR is significant when the 95% CI does not include 1.00.

2.4 Ethics

The study was approved by the Regional Committee for Medical Research Ethics in Western Norway and was conducted in accordance with the Declaration of Helsinki. Participation was voluntary, and informed consent was collected. Participants were informed that they could withdraw from the study at any time without stating a reason. Among those who completed the survey, two were randomly drawn to receive an iPad or an iPad mini.

3 Results

3.1 Demographics

The demographic characteristics of the sample and the mean scores of the predictor variables are presented in Tab. 1.

Nearly 60% of the sample had only been deployed once, while nearly 18% had been deployed twice, 12% had been deployed three times, 4% had been deployed four times, and 8% had been deployed five times or more. For the majority of the sample (56.4%), the time since last deployment was 3 years or more when filling out the questionnaire. Approximately 10% of the sample had been deployed during the previous 12 months.

3.2 Gaming problems

In the current sample, 125 veterans (approximately 50%) reported participation in some form of gaming during the past 6 months. According to the criteria offered by Charlton and Danforth (2007), 114 veterans (91.2% of those who had participated in gaming) were classified as nonproblem gamers and 11 veterans (8.8%) were classified as problem gamers.

Regarding awareness of possible gaming problems, 12 participants (9.6%) of those who had participated in gaming (n = 124) answered "yes" to the question: "I think I play too much electronic games", and eight participants (6.5%) answered that their partner/important others were worried because they were gaming too much. However, only two participants (1.6%) answered that they thought they had a gaming problem.

Tab. 1: Descriptive data for the sample (N = 246).

	n (%)	Mean (SD)
Gaming participation		
Participated within past 6 months	125 (50.4)	
Addicted gamer	0	
Problem gamer	7 (5.6)	
Highly engaged gamer	4 (3.2)	
Nonproblem gamer	114 (91.2)	
Gender		
Male	225 (91.5)	
Female	21 (8.5)	
Age		37.5 (9.6)
Months deployed		
0–6 months	81 (33.5)	
7–12 months	72 (29.8)	
13 months or more	89 (36.8)	
Previous deployments		
1	140 (58.6)	
2	42 (17.6)	
3	29 (12.1)	
4	9 (3.8)	
5 or more	19 (7.9)	
Marital status		
Partner	198 (80.8)	
No partner	47 (19.2)	
Education level		
Lower secondary education	7 (2.9)	
Upper secondary education	73 (30.3)	
<3 years higher education	86 (35.7)	
>3 years higher education	75 (31.1)	
Employment status		
Full time, part time	226 (92.2)	
Not working	6 (2.4)	
Student	13 (5.3)	
Social motivation		6.2 (1.6)
Coping motivation		6.9 (1.9)
Enhancement motivation		9.7 (2.9)
Anxiety		2.3 (0.7)
Depression		3.8 (1.2)
Boredom proneness		
Lack of internal stimulation		27.7 (4.3)
Lack of external stimulation		18.9 (5.8)
Loneliness		4.4 (3.2)
Hazardous drinking		4.7 (1.8)
Nonhazardous drinking	54 (23.2)	
Hazardous drinking	179 (76.8)	
Combat exposure		7.2 (7.4)
Light combat	167 (69.0)	
Light-to-moderate combat	38 (15.7)	
Moderate combat	31 (12.8)	
Moderate-to-heavy combat	5 (2.1)	
Heavy combat	1 (0.4)	

Note: Percentage of gaming participation is calculated from the total sample of N = 246, while the percentage of problem vs. nonproblem gamer is calculated for the total of those who participated in gaming (n = 125).

3.3 Prediction of gaming problems

The correlations among the predictor variables are presented in Tab. 2. Gender was significantly correlated with social motivation, depression, lack of internal stimulation, and loneliness; and loneliness was significantly correlated with lack of internal stimulation and hazardous drinking.

In the crude logistic regression analyses in which presence of gaming problems was entered as the criterion variable (0 = nonproblem gaming, 1 = problem gaming), six of the 12 predictor variables (social motivation, coping motivation, enhancement motivation, depression, boredom proneness – lack of internal stimulation, and loneliness) showed a significant relationship with gaming problems, but only two of these (enhancement motivation and lack of internal stimulation) remained significant in the adjusted analysis (Tab. 3).

In the adjusted analysis, high scores on enhancement motives (OR = 2.22) and high scores on boredom proneness – lack of internal stimulation (OR = 1.45) were related to gaming problems. The Nagelkerke *R*-squared value was 0.652, suggesting that >65% of the variance in gaming problem status was explained by the predictor variables in the current study.

4 Discussion

The results of this study showed that approximately 91% of the veteran sample was classified as a normal (or nonproblem) gamer, while nearly 9% showed symptoms indicative of problematic use of gaming. According to Charlton and Danforth's (2007) criteria, none of the veterans in this study fulfilled the criteria for addicted gamers, but 5.6% were categorized as problem gamers and 3.2% as highly engaged gamers. Compared to a representative sample of Norwegian gamers (Wittek et al. 2016), the prevalence rates of problem gaming among the veterans were slightly lower. In the general population, 1.4% were classified as addicted gamers, 7.3% as problem gamers, 3.9% as highly engaged gamers, and 87.4% as nonproblem gamers (Wittek et al. 2016). This may indicate that veterans are healthier than average (with regard to gaming) and this may be a result of the rigorous screening on both physical and psychological variables prior to service.

The absence of gaming addiction among the veterans may also be attributed, at least partially, to the age of the sample. The mean age in the veteran sample was

Tab. 2: Correlations among predictor variables.

Predictor variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	–											
2. Age	0.000	–										
3. Lack of internal stimulation	−0.009	−0.039	–									
4. Lack of external stimulation	−0.116	**−0.283**	0.087	–								
5. Loneliness	0.002	−0.050	**0.223**	**0.383**	–							
6. Social motivation	−0.010	**−0.322**	0.131	0.163	0.131	–						
7. Coping motivation	0.008	**−0.196**	**0.180**	0.139	**0.272**	**0.520**	–					
8. Enhancement motivation	−0.117	**−0.324**	0.064	0.066	0.136	**0.549**	**0.629**	–				
9. Anxiety	0.042	−0.112	0.084	0.120	**0.238**	0.106	**0.236**	0.153	**–**			
10. Depression	0.071	−0.099	0.161	0.235	**0.388**	**0.318**	**0.444**	**0.204**	**0.503**	–		
11. Hazardous drinking	0.023	−0.122	−0.113	**0.161**	0.020	0.128	−0.107	−0.052	−0.028	0.074	–	
12. Combat exposure	−0.089	0.**232**	−0.092	**0.203**	**0.129**	0.141	0.034	0.045	**0.177**	**0.128**	0.108	–

Note: Significant correlations are shown in bold type.

Tab. 3: Predictors of problem gaming (N =246).

Predictor variables	Prediction of problem gaming			
	Crude analysis		Adjusted analysis	
	OR	95% CI	OR	95% CI
Gender				
Male (n = 225)	1.00		1.00	
Female (n = 21)	0.65	[0.07–5.86]	0.79	[0.00–6.86E+17]
Age	0.96	[0.87–1.05]	1.11	[0.93–1.33]
Boredom proneness				
Lack of internal stimulation	1.20	[1.03–1.40]*	1.45	[1.01–2.06]*
Lack of external stimulation	1.09	[0.99–1.21]	1.07	[0.92–1.25]
Loneliness	1.22	[1.03–1.46]*	1.03	[0.63–1.67]
Social motivation	1.89	[1.29–2.76]**	1.30	[0.54–3.12]
Coping motivation	2.11	[1.47–3.03]**	1.18	[0.71–1.98]
Enhancement motivation	1.67	[1.28–2.17]**	2.22	[1.12–4.41]*
Anxiety	1.57	[0.81–3.04]	0.65	[0.13–2.32]
Depression	1.89	[1.28–2.77]**	1.35	[0.62–3.04]
Hazardous drinking	1.15	[0.82–1.62]	0.59	[0.03–11.67]
Combat exposure	1.05	[0.98–1.12]	1.12	[0.98–1.29]

Notes: OR = odds ratio; CI = confidence interval.
*$p < 0.05$; **$p < 0.001$.

37.5 years, compared to 32.6 years in the general population considered in this study. The majority of the veterans were aged above 30 years, while the majority of the other sample was younger than 30 years. Research has consistently shown that gaming addiction is far more prevalent in younger age groups (e.g., Lemmens et al. 2009; Mentzoni et al. 2011; Wittek et al. 2016). It is also possible that future generations of veterans will be more vulnerable for developing gaming addiction later in life because they have been more exposed to gaming while growing up. Future studies are needed to investigate this issue further.

The second aim of this study was to investigate whether boredom and loneliness could predict gaming problems among veterans beyond the already established risk factors, such as gender, age, anxiety, and depression. In the crude analyses, boredom, loneliness, and four of the other predictor variables (social motivation, coping motivation, enhancement motivation, and depression) showed significant relationships with gaming problems. However, in the adjusted analysis, when controlling for the effect of every other predictor variable, only two of the six predictors remained significant: boredom proneness (lack of internal stimulation) and enhancement motivation. Loneliness failed to remain a significant predictor in the adjusted analysis, indicating that some of the variance was accounted for by other variables. This finding does not concur with previous findings of loneliness as a significant predictor of gaming problems (e.g., Lemmens et al. 2011; Myrseth et al. 2017; Seay and Kraut 2007). In the current study, the predictor variables jointly accounted for >65% of the variance in the gaming problem status in the multivariate analysis, which is assumed to be considerable.

The finding that lack of internal stimulation (but not lack of external stimulation) emerged as a significant predictor of gaming problems among the veterans indicates that those who are less able to produce internal stimulation are more prone to developing gaming problems. Previously, lack of external stimulation has been found to be associated with problem gaming among Norwegian conscripts (Myrseth et al. 2017). Nevertheless, this finding is in line with previous findings showing that greater

levels of boredom are associated with gaming addiction (Chiu et al. 2004), as well as with other addictions such as problem gambling (e.g., Blaszczynski et al. 1990; Mercer and Eastwood 2010) and alcohol abuse (e.g., Flory et al. 2011). However, the cross-sectional design of the current study does not permit the drawing of conclusions about the causal direction between these concepts. It is possible that gaming problems cause or contribute to a greater lack of internal stimulation. As gaming may be considered a form of external stimulation, it is possible that high levels of gaming will interfere with the individuals' ability to generate internal stimulation because gamers are so used to getting external stimulation. More longitudinal research is warranted to investigate this issue further.

Gaming for enhancement emerged as the strongest predictor of gaming problems in the veteran sample, with an OR of 2.22. This indicates that problem gamers have 2.22 higher odds of scoring high on enhancement motivation. This finding is in line with results from studies on other addictions, which show that enhancement motives are associated with heavier drinking and alcohol problems in adults (Cooper et al. 1992) and with gambling problems (Stewart and Zack 2008). Previous studies have found enhancement motives to be correlated with male gender among gamblers, and that male gender, older age, and higher enhancement scores were significant independent predictors of loss of control over gambling (Stewart and Zack 2008). Video game playing has been shown to activate the release of dopamine in the brain's reward circuit (Koepp et al. 1998), which may explain why video game playing is experienced as pleasurable or rewarding. Gaming may therefore be especially attractive for those individuals who are highly motivated by enhancement motives or are motivated to seek positive emotions.

4.1 Limitations of the current study

The low Cronbach's alpha of the boredom proneness subscale "lack of internal stimulation" represents a possible limitation in this study and may indicate that this variable has low internal consistency, i.e., does not measure a uniform construct. Although the subscales lack of Internal stimulation and lack of external stimulation displayed good internal consistency in the original study, with values of 0.86 and 0.89, respectively (Vodanovich et al. 2005), the corresponding Cronbach's alpha values in the current study were only 0.49 and 0.66. This may indicate that the questionnaire does not work as intended in the current sample, and additional studies are warranted in order to test whether the subscale lack of internal stimulation will also be predictive of gaming problems in other samples and contexts.

The small sample size in this study may also represent a possible limitation. Some of the predictors of problem gaming (e.g., combat exposure and age) were close to reaching significance in the logistic regression analyses and may have been significant in a larger sample. Replications with larger samples are therefore warranted.

The current study also had a cross-sectional design, which does not permit making assumptions about the causal direction of the relationship between these concepts. Hence, there is a need for longitudinal studies investigating this issue further.

4.2 Practical implications

Given the rise in gaming activity among the general population during the past decades and the negative impact of excessive gaming, studies such as ours comprise an important step in monitoring the possible negative effects of deployments and, thus, constitute a part of the general effort to support the health of veterans. As this was the first study to investigate gaming behavior and gaming problems among veterans, it represents a somewhat new direction in the investigation of veterans' health and well-being. Although gaming addiction was not a particular prevalent problem in the current sample, gaming was not an insignificant problem in the veteran population either; thus, it may be useful to attend to these issues in health care development and caretaking programs for veterans. An important step in establishing appropriate health screening batteries could be to include a screening for gaming problems in order to better attend to the many possible health issues that veterans may experience after homecoming.

The majority of the veterans did not report problem gaming. The fact that the problem gaming rates were not higher among veterans compared to the general population may indicate that deployment and combat exposure do not contribute to a greater risk of developing gaming problems, based on the findings from this study. Hence, there is no immediate need for developing interventions to prevent excessive gaming among veterans in general.

The current study showed that approximately 9% of the veterans reported problem gaming behavior, and some veterans seem to be more vulnerable to developing gaming problems than others. The results indicated that those characterized by lack of internal stimulation and strong

enhancement-seeking motivation may be especially prone to developing gaming problems. Providing social support or activities that are stimulating and enhancing may be especially useful for veterans with greatest risk for developing gaming problems.

5 Conclusions

Numerous previous studies have shown that adjustment to a regular life situation after homecomings may be difficult for veterans, and that veterans are at risk for developing different psychosocial problems. The results of the current study add to the previous body of knowledge showing that gaming addiction is not particularly prevalent among the veterans. Still, some veterans, especially those who lack internal stimulation and are highly motivated by enhancement motives, may be prone to developing gaming problems, which may subsequently develop into gaming addiction.

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7 Conflicts of interest

The authors declare no conflicts of interest.

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