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## Gambling Problems and Military- and Health-Related Behaviour in UK Armed Forces Veterans

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### ABSTRACT

Internationally, problem gambling is elevated in Armed Forces veterans compared to the general population. Here, we re-examined the prevalence of problem gambling in veterans and non-veterans residing in England using an established large dataset and investigated whether gambling was associated with length of service, common mental health disorders, substance abuse, or financial management history. Using the 2007 Adult Psychiatric Morbidity Survey, 257 post-national service veterans and 514 age- and sex-matched controls were compared. Veterans had significantly higher rates of problem gambling than non-veterans. Male veterans were more likely than non-veterans to have experienced a traumatic event. The relationship between veteran status and problem gambling was not explained by differences in mental health conditions, substance abuse, or financial management. No differences were found for length of service. Further research is required with larger samples targeting problem gambling and Armed Forces experience in the United Kingdom population using contemporary diagnostic criteria.



### KEYWORDS

Gambling; mental health; Armed Forces; post-national service; veteran

The transition from active military service to civilian life can be challenging. For instance, Armed Forces veterans are more likely to engage in high-risk behaviours like alcohol and substance abuse, and excessive gambling (Steenbergh, Whelan, Meyers, Klesges, & DeBon, 2008). Despite differences in service life, baseline mental health levels and veteran assistance and care provision across international armed forces, growing evidence indicates a specific vulnerability to gambling-related harm in veterans (Levy & Tracy, 2018). To date, however, relatively little is known about whether United Kingdom (UK) veterans have higher rates of gambling-related problems compared to the general population, or whether groups of veterans, such as those with pre-existing mental health conditions, or veterans who left the services at different times, are at greater risk.

International studies reveal that problem gambling rates are higher in, for example, American Indian and Hispanic American veterans (Westermeyer, Canive, Garrard, Thuras, & Thompson, 2005), in hospitalised,

substance-dependent United States (US) veterans (Daghestani, Elenz, & Crayton, 1996), and treatment-seeking Australian veterans (Biddle, Hawthorne, Forbes, & Coman, 2005), compared to the non-veteran population. Although rates of problem gambling in subgroups of veterans such as those receiving mental health treatment from the US Veterans Health Administration are low (Edens & Rosenheck, 2012), they may suggest underdiagnosis of a problem known to be a significant predictor of homelessness in both veterans in transition (Edens, Kaspro, Tsai, & Rosenheck, 2011) and the general population (Sharman, Dreyer, Aitken, Clark, & Bowden-Jones, 2015). Other, more recent studies (Whiting et al., 2016) have reported a problem gambling prevalence rate of 4.2% in a US Armed Forces sample, which is almost twice that found in civilian samples (Kessler et al., 2008) and over four times higher than the general population prevalence rate in the UK (Gambling Commission, 2017; Wardle, Griffiths, Orford, Moody, & Volberg, 2012).

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Given growing concerns about increased opportunities to gamble (Gainsbury, Russell, Blaszczynski, & Hing, 2015), it is both timely and important to assess the nature and extent of gambling problems faced by UK veterans. Recently, we reported preliminary findings indicating that UK veterans may be at elevated risk of developing gambling problems compared to nonveterans (Roberts et al., 2017). This finding was further replicated and extended by our group to explore the potentially negative impact of gambling-related harms on veterans' families (Dighton, Roberts, Hoon, & Dymond, 2018). Both studies were, however, limited by small sizes. Taken together, the combined findings from these secondary analyses of large datasets (the last time such representative data was obtained on gambling-specific survey questions) are broadly consistent with international research showing higher prevalence rates of gambling-related problems among veterans.

Gambling problems rarely, if ever, occur in isolation and often lie at the root of financial difficulties such as debt and money worries. During transition, 10% of UK ex-Service households report not having enough money or savings for daily living costs and fall into debt (The Royal British Legion, 2014). Moreover, it is known that increasing levels of problematic gambling are associated with difficulties in financial management (Wardle et al., 2012), creating a spiral of debt and gambling that can be hard to break. Indeed, the UK Citizens' Advice service has acknowledged that worsening financial problems is a particularly difficult task for veterans in transition (Citizens' Advice Scotland, 2012).

Coping with debt and financial worries can also lead to, or exacerbate, mental health problems. The interaction between mental health and problem gambling in veterans is therefore complex and bidirectional. Dealing with an often-hidden gambling problem after active service may lead to adverse personal and social consequences, and the risk of gambling-related harm may be exacerbated by pre-existing mental health conditions. For instance, veterans who suffer from post-traumatic stress disorder (PTSD) may be at heightened risk of developing a gambling problem (Biddle et al., 2005). Similarly, in civilian populations, problem gambling is associated with a range of mental health challenges such as mood disorders (Lorains, Cowlshaw, & Thomas, 2011), substance abuse (Black & Moyer, 1998), and anxiety and neurotic symptoms (Cowlshaw & Kessler, 2015). It may be salutary, therefore, to assess the impact of gambling-related problems in UK Armed Forces veterans alongside their service history, financial management

concerns, and mental health problems (Hierholzer, Vu, & Mallios, 2010; Woodhead et al., 2011).

The present study undertook a re-examination of the gambling-related problems of UK veterans living in England (Dighton et al., 2018) by including veteran status, mental health, substance abuse, and financial difficulties as additional factors in the analyses. Our aim was to investigate the prevalence of problem gambling and related difficulties amongst UK veterans and non-veterans and whether gambling behaviour was related to length of service in the Armed Forces, the presence of co-occurring common mental health disorders (anxiety, depression, phobia, and trauma), substance abuse (alcohol and illicit drugs), or financial management history (e.g., debt). Using a large dataset from a population-wide representative survey, the present study first sought to replicate Dighton et al. (2018) findings and to then explore further trends with our chosen military-service and health-related variables.

## Method

### Participants

Analyses were conducted on data from the third edition (UK Data Service, 2018) of the 2007 Adult Psychiatric Morbidity Survey (APMS), the fieldwork for which was carried out between October 2006 and December 2007 (McManus, Meltzer, Brugha, Bebbington, & Jenkins, 2009). The 2007 APMS was used because the most recent version (McManus, Bebbington, Jenkins, & Brugha, 2016) did not include questions on gambling behaviour.

The 2007 APMS is a stratified random-probability, population representative, survey of community-dwelling adults in England, surveying a range of demographic and mental health measures, as well as age, sex, ethnicity, educational qualification level, marital status, and socioeconomic status. Sampling required multiple stages: primary sampling units (PSUs) comprising of postcode sectors; stratification of PSUs based on socioeconomic status within the region; sampling of address areas within postal sectors; sampling of private households within address areas; and selecting one adult, aged over 16, for interview in each household. Fifty-seven percent of eligible individuals agreed to participate in the 2007 survey, resulting in a dataset of 7,461 cases. Participants were paid up to £10 in high street vouchers for their time; interviews, at this stage, averaged 1.5 hours. For a more detailed account of the sampling methods, procedure, and quality control of the survey, see McManus et al. (2009).

In line with previous work (Dighton et al., 2018; Woodhead et al., 2011), the following exclusions were applied: proxy interviews, individuals who were currently serving in the military, veterans reporting improbable ages at the time of joining the military (i.e., joining under the age of 16 or over the age of 55), veterans who served before the end of compulsory National Service in 1960, and nonveterans of a comparable age (i.e., 65 years and older). With these exclusions applied, the testable sample was reduced to 5,480 individuals (74% of the total sample), 257 of whom were military veterans.

Veterans were significantly more likely to be male than nonveterans and were also significantly older than nonveterans. As the incidence of mental health problems and gambling behavior may vary by age and sex (Cowlshaw & Kessler, 2015), an age- and sex-matched control sample was generated by randomly matching eligible non-veterans in the dataset with the veteran cohort using the plugin FUZZY.spe for case-control matching in IBM SPSS Statistics for Windows, version 19 (IBM Corp., Armonk, NY, USA). This procedure follows similar work conducted using the APMS (Woodhead et al., 2011). The final sample included 257 military veterans and 514 age- and sex-matched non-veterans.

## Measures

### Length of service

Participants were asked whether they had ever served in the Armed Forces and, if they had, were asked which year they had joined and, if applicable, which year they had left. Veterans were categorized as either early leavers or non-early leavers, depending on whether the minimum 4-year engagement period was completed. Early leavers may be more likely to suffer from mental health and other problems (Buckman et al., 2013; Iversen et al., 2005; Jones, Fear, Greenberg, Hull, & Wessely, 2009), sometimes reflecting disciplinary or temperamental issues (Buckman et al., 2013).

### Gambling problems

Participants answered questions relating to the ten DSM-IV criteria for pathological gambling (American Psychiatric Association, 1994). Each criterion was assessed as a binary “yes/no” question (e.g., “Do you find that you are restless or irritable when you attempt to cut down or stop gambling?”), with a maximum of score of ten suggesting that the participant experiences all ten symptoms. Participants scoring

zero (no symptoms) were classed as “no risk,” those scoring 1–2 were classed as “*at risk*,” those scoring 3 or more of the symptoms were classified as “problem gamblers,” and those scoring 5 or more were classified as “pathological gamblers.”

### Mental health symptoms

Participants were surveyed for several mental health symptoms, including anxiety, depression, phobias, and trauma. Symptoms for any common neurotic disorder were tested using the Revised Clinical Interview Schedule (CIS-R; Lewis, Pelosi, Araya, & Dunn, 1992). Suicidal thoughts and attempts were tested using self-completion measures specified in the CIS-R (e.g., “Have you ever made an attempt to take your life, by taking an overdose of tablets or in some other way?”). Participants were asked whether they had experienced any traumatic events since the age of 16 years and were assessed using the *Trauma Screening Questionnaire* (TSQ; Brewin et al., 2002). The TSQ is a 10-item self-report measure derived from the DSM-IV criteria for PTSD. Participants were asked to respond “yes” if they had experienced any of the PTSD symptoms at least twice during the past week (e.g., “Irritability or outbursts of anger”). The advised cutoff score of 6 out of 10 was used to determine if someone is likely to be suffering from PTSD.

### Substance abuse

Alcohol abuse was measured using the 10-item self-report Alcohol Use Disorders Identification Test (AUDIT). Participants were asked questions on how often they drink, and questions referring to how often they feel alcohol affects them (e.g., “How often during the last year have you found that you were not able to stop drinking once you had started?”). Response options ranged from 0 (*never*) to 4 (*daily or almost daily*). cutoff score of 8 was used to determine “hazardous drinking.” Alcohol dependence in individuals scoring >10 on the AUDIT was then tested using the Severity of Alcohol Dependence Questionnaire, community version (SADQ-C; Stockwell, Murphy, & Hodgson, 1983). The SADQ-C is a 20-item self-report questionnaire, asking respondents to state whether symptoms of alcohol dependence (e.g., “The day after drinking alcohol, I woke up feeling sweaty”) occur “almost never” to “nearly always” with this 4-point Likert scale scored from 0 to 3. McManus et al. (2009) coded individuals as either alcohol dependent or not based on a cutoff score of 4 (“mild alcohol dependency”). Participants were also given a list of recreational drugs and asked which, if any, they had

**Table 1.** Age, marital status, ethnicity, educational qualifications, and socio-economic class compared between veterans and non-veterans by sex

Variable	Males					Females				
	Veterans ( <i>n</i> = 210)		Non-veterans ( <i>n</i> = 420)		<i>p</i>	Veterans ( <i>n</i> = 47)		Non-veterans ( <i>n</i> = 94)		<i>p</i>
	<i>n</i>	%	<i>n</i>	%		<i>n</i>	%	<i>n</i>	%	
<b>Age group</b>										
16–24	5	4.36	10	3.70		4	17.20	8	11.99	
25–34	21	13.80	42	12.22		6	11.82	12	13.87	
35–44	59	27.21	118	29.58	0.960	10	18.36	20	21.73	0.892
45–54	48	24.28	96	24.36		12	28.19	24	24.52	
55–64	77	30.35	154	29.87		15	24.42	30	27.89	
<b>Marital status</b>										
Married/cohabiting	150	79.59	272	72.28		26	65.38	62	70.42	
Single	24	10.65	80	17.16	0.116	7	17.36	19	22.31	0.223
Widowed/divorced/separated	36	9.76	68	10.56		14	17.25	13	7.27	
<b>Ethnic origin</b>										
White	200	94.49	387	89.55	0.085	44	85.84	87	91.37	0.476
Non-White	10	5.51	32	10.45		3	14.16	6	8.63	
<b>Educational qualifications</b>										
Degree	45	23.45	99	24.92		9	23.31	18	19.51	
Teaching, (HND), nursing	15	7.17	36	8.10		6	13.08	4	5.08	
A-level	38	19.48	72	17.61	0.046*	10	18.87	12	13.25	0.321
General Certificate of Secondary Education (GCSE) or equivalent	65	32.31	107	28.18		13	35.22	31	39.47	
Foreign/other	11	4.50	5	9.70		2	3.15	7	6.36	
No qualifications	30	13.08	94	20.21		5	6.36	15	16.33	
<b>Socioeconomic class</b>										
Managerial & professional	71	36.38	163	40.86		16	34.20	23	24.54	
Intermediate occupations/small employers & own account workers	31	15.11	62	16.19	0.321	5	9.96	16	18.03	0.342
Routine/lower tech/lower supervisory	73	34.10	109	26.17		9	22.49	27	32.06	
Never worked/long-term unemployed	34	14.41	84	16.78		17	33.35	27	25.37	

Note. HND = Higher National Diploma; GCSE = General Certificate of Secondary Education. *p* = Pearson's  $\chi^2$  with Rao & Scott corrections for complex survey design. The asterisk (\*) denotes significant result. All percentages weighted to account for survey design. Frequencies are unweighted and may not sum due to missing values. Data from a similarly extracted 2007 Adult Psychiatric Morbidity Survey veterans' sample were previously analyzed and reported by Dighton et al. (2018) and Woodhead et al. (2011).

ever taken, and dependence scores (for those reporting drug use) were calculated.

### Financial management problems

A range of questions assessed participants' financial management difficulties. Participants were asked whether, in the last 12 months, they had to borrow money for any reason, or had fallen behind in paying any bills. They were also asked whether they had spent any money on gambling.

### Statistical analysis

Pearson's  $\chi^2$  tests (with Rao and Scott second-order corrections for survey design) and binary logistic regression analyses were used to test the relationships between gambling problems and veteran status. The relationships between veteran status, mental health, and substance abuse were tested using logistic regression analyses. Significance levels (*p*), odds ratios (*OR*) and 95% confidence intervals (*CI*) were calculated. All analyses were conducted using STATA, which allowed for weighting, clustering, and stratification to correct for complex survey design. Details of the calculations

of the weights and clusters in the 2007 APMS data can be found in McManus et al. (2009).

### Ethics

This study comprises a secondary analysis of a Public Health data set made available for research. Ethics for the original fieldwork for the APMS 2007 was obtained from the Royal Free Hospital and Medical School Research Ethics Committee (06/Q0501/71).

### Results

#### Demographic data

Of the total sample, 4.7% (*n* = 257) were Armed Forces veterans (81.7% males; *n* = 210). The matched sample ensured that the median ages of the groups were near-identical: in veterans, the median age was 49 (interquartile range [IQR] = 40–59) for males and 46 (IQR = 39–58) for females, and in non-veterans the median ages were 49 (IQR = 39–58) and 48 (IQR = 36–58), respectively. Male veterans and non-veterans differed in educational qualifications (A-level), and no other



**Table 2.** Gambling score, measured using *DSM-IV* criteria, by veteran status and leaver status

Variable	Veterans ( <i>n</i> = 242)		Early leavers ( <i>n</i> = 106)		Non-veterans ( <i>n</i> = 477)		Non-early leavers ( <i>n</i> = 135)		<i>p</i>	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
<b>Gambling score</b>										
No risk	233	96.39			456	96.01			0.819	0.108
At risk	6	2.21			18	3.54			0.368	
Problem	3	1.41			1	0.17			0.036*	
Pathological	0	0			2	0.03			0.337	
<b>Gambling score</b>										
No risk			103	97.17			129	95.56	0.512	0.292
At risk			1	0.94			5	3.70	0.172	
Problem			2	1.89			1	0.74	0.426	
Pathological			0	0			0	0	0	

Note. *p* = Pearson's  $\chi^2$  with Rao & Scott corrections for complex survey design. The asterisk (\*) denotes significant result. All percentages weighted to account for survey design. Frequencies are unweighted and may not sum due to missing values.

**Table 3.** Mental health, substance abuse, and financial management by veteran status and gender

Variable	Males						Females					
	Veterans ( <i>n</i> = 210)		Non-veterans ( <i>n</i> = 420)		<i>p</i>	Odds ratio (95% CI)	Veterans ( <i>n</i> = 47)		Non-veterans ( <i>n</i> = 94)		<i>p</i>	Odds ratio (95% CI)
	<i>n</i>	%	<i>n</i>	%			<i>n</i>	%	<i>n</i>	%		
<b>Mental health</b>												
Trauma experienced (ever)	102	49.49	160	36.67	0.005*	1.69 (1.17–2.44)	19	41.26	29	32.63	0.395	1.45 (0.61–3.44)
Likely PTSD	7	2.84	10	1.98	0.475	1.45 (0.52–4.03)	3	4.38	6	6.22	0.655	0.69 (0.13–3.57)
Suicide attempt (ever)	12	4.85	16	2.93	0.182	1.69 (0.78–3.68)	9	15.71	9	7.89	0.139	2.17 (0.76–6.22)
Neurotic symptoms (any)	23	8.44	59	11.39	0.237	0.71 (0.41–1.25)	14	26.44	26	29.58	0.691	0.86 (0.39–1.85)
<b>Substance abuse</b>												
Alcohol dependence (SAD-Q 4+)	22	10.61	38	8.17	0.378	1.33 (0.70–2.53)	0	0	6	5.56	0.111	n/a
Drinking problem (AUDIT 8+)	74	36.21	147	33.59	0.546	1.12 (0.77–1.63)	7	11.49	15	14.66	0.606	0.76 (0.26–2.20)
Ever used drugs	49	27.36	123	29.74	0.577	0.89 (0.59–1.34)	12	28.36	23	19.78	0.293	1.61 (0.66–3.91)
Dependent on a drug	10	5.20	13	2.69	0.115	1.98 (0.83–4.73)	0	0	2	1.68	0.351	n/a
<b>Financial management</b>												
Had to borrow money	15	6.17	30	6.98	0.709	0.88 (0.44–1.75)	2	5.75	13	12.86	0.235	0.41 (0.09–1.86)
Behind in paying bills	20	9.70	41	10.05	0.902	0.96 (0.52–1.79)	6	11.66	11	11.97	0.960	0.97 (0.32–2.99)
Spent money on gambling	166	79.09	304	73.43	0.132	1.37 (0.91–2.06)	27	51.49	59	62.89	0.264	0.63 (0.27–1.43)

Note. CI = confidence interval; PTSD = posttraumatic stress disorder. *p* = Pearson's  $\chi^2$  with Rao & Scott corrections for complex survey design. The asterisk (\*) denotes significant result. All percentages weighted to account for survey design. Frequencies are unweighted and may not sum due to missing values. Odds ratio adjusted for age. Data from a similarly extracted 2007 Adult Psychiatric Morbidity Survey veterans' sample were previously analyzed and reported by Woodhead et al. (2011).

differenced were found for either gender in marital status, ethnicity, or socio-economic class (Table 1).

### Gambling problems

The prevalence rate of *DSM-IV* problem gambling, but not pathological gambling, was significantly higher ( $p < .05$ ) in veterans (1.41%;  $n = 3$ ) than in non-veterans (.17%;  $n = 1$ ; see Table 2). No differences in gambling severity scores were noted between veterans and non-veterans deemed either “no risk” or “at risk.” Within veterans, a higher proportion of those who served for more than four years were deemed at risk of problem gambling (Table 2), although this difference was not significant.

### Mental health

Male veterans were significantly more likely than non-veterans to have ever experienced a traumatic event

(Table 3), a finding that was maintained after adjustment for age (odds ratio [OR] = 1.69, 95% CI = 1.17–2.44). Within veterans, non-early leavers (those who had served for more than 4 years) were significantly more likely to have experienced a traumatic event than early leavers (Table 4). We did not find significant associations between veteran or early leaver status and any other mental health variables (see also, Woodhead et al., 2011). A logistic regression model including both trauma and veteran status did not significantly predict gambling problems (OR = 0.42, 95% CI = 0.17–1.03).

### Substance abuse and financial management

We did not find any significant relationships between veteran status or early leaver status and use of alcohol or drugs. Finally, there were no significant differences between veterans and non-veterans, or between early and late leavers, in reported financial difficulties.

**Table 4.** Mental health, substance abuse, and financial management by leaver status

Variable	Early leavers (n = 114)		Non-early leavers (n = 142)		p	Odds ratio (95% CI)
	n	%	n	%		
<b>Mental health</b>						
Trauma experienced (ever)	46	40.24	74	54.70	0.041*	0.56 (0.32–0.98)
Likely PTSD	3	1.53	7	4.41	0.153	0.34 (0.07–1.61)
Suicide attempt (ever)	12	7.21	9	5.88	0.653	1.24 (0.48–3.23)
Neurotic symptoms (any)	21	12.02	16	10.44	0.703	1.17 (0.52–2.67)
<b>Substance abuse</b>						
Alcohol dependence (SAD-Q 4+)	12	11.98	10	6.64	0.173	1.91 (0.74–4.95)
Drinking problem (AUDIT 8+)	31	29.03	50	35.80	0.274	0.73 (0.42–1.28)
Ever used drugs	32	32.21	29	23.79	0.161	1.52 (0.84–2.75)
Dependent on a drug	4	4.22	6	4.64	0.853	0.90 (0.31–2.65)
<b>Financial management</b>						
Had to borrow money	14	10.71	3	2.76	0.072	3.99 (0.79–20.0)
Behind in paying bills	17	12.51	8	7.06	0.200	1.88 (0.70–5.04)
Spent money on gambling	86	74.07	107	76.44	0.718	0.88 (0.44–1.77)

Note. CI = confidence interval; PTSD = posttraumatic stress disorder; SAD-Q = the Severity of Alcohol Dependence Questionnaire; AUDIT = Alcohol Use Disorders Identification Test.  $p$  = Pearson's  $\chi^2$  with Rao & Scott corrections for complex survey design. The asterisk (\*) denotes significant result. All percentages weighted to account for survey design. Frequencies are unweighted and may not sum due to missing values. Odds ratio adjusted for age.

## Discussion

In line with previous findings, we again found significantly different problem gambling rates between small numbers of community-dwelling U.K. veterans and non-veterans (Dighton et al., 2018). In addition, male veterans were more likely than non-veterans to have experienced a major traumatic event. However, neither veteran status nor length of service were associated with certain common mental health conditions (e.g., PTSD, suicide attempts or neurotic disorder), substance abuse or financial management problems.

The findings are consistent with international evidence showing elevated rates of problem gambling in Armed Forces veterans compared to civilian populations in the US (Whiting et al., 2016) and Australia (Biddle et al., 2005). The prevalence rate of problem gambling among veterans which we identified here (1.41%;  $n = 3$ ) is lower than that previously reported by veterans' surveys conducted in the United States. For example, Whiting et al. (2016) found a combined prevalence rate of 4.2% for At Risk and Problem Gambler categories, while Westermeyer et al. (2005) described a rate of 7.6% for the most severe category of Pathological Gamblers. These differences in prevalence rates with our findings may be related to the fact that many of the US veterans were in treatment or seeking treatment for gambling and other mental health disorders. This notwithstanding, the problem gambling rate among veterans in the current study was significantly higher than in non-veterans (.17%;  $n = 1$ ); a finding consistent with previous evidence. While few cases of more severe gambling were indicated in the sample, the same number of individuals with problem or pathological gambling were noted in veterans and non-veterans; through the sample,

however, included only almost half of the number of veterans as comparisons (242 veterans versus 477 non-veterans).

It is well known that veteran status and trauma experience (Murphy, Ashwick, Palmer, & Busuttill, 2017) and, in non-veterans, mental health problems and problem gambling (Cowlshaw, Gale, Gregory, McCambridge, & Kessler, 2017), are highly associated. However, the lack of an association between veteran status and certain other mental health conditions in our data mirrors the findings of previous studies of the 2007 APMS obtained using the CIS-R. The CIS-R assesses common mental disorders such as depression, anxiety disorders, and neurotic symptoms, but it does not address severe mental illnesses including bipolar disorder and psychotic disorders (schizophrenia, delusional disorders). In their analysis of the 2007 APMS dataset, Woodhead et al. (2011) found that Armed Forces experience was associated with violence in male veterans, but not with the common mental health conditions outlined above. Similar to our findings, Woodhead and colleagues' also found no evidence for a relationship between veteran status and substance abuse. Further research is needed to examine the relationship, if any, between serious mental illness and problem gambling in UK Armed Forces veterans.

Although our results are consistent with research analyzing the APMS, they are inconsistent with research, albeit conducted using different instruments, showing that currently serving personnel are more likely than non-veterans to suffer from both common mental disorders (Goodwin et al., 2015) and drinking problems (Fear et al., 2007). Non-veterans from the lowest income quartiles also have elevated rates of problem gambling (Orford, Wardle, Griffiths,

Sproston, & Erens, 2010), an effect that we were unable to examine with our limited veterans sample. Moreover, with the current dataset we were also unable to analyse the factors influencing the transition from active service.

Possible explanations for the current findings may therefore lie in the limitations of the APMS. For example, the 2007 APMS was a survey of community-dwelling adults in England. It did not recruit individuals from elsewhere in the UK and living in care homes, psychiatric institutions, or who may have been homeless at the time—factors that may be associated with elevated rates of problem gambling, PTSD and depression (Hierholzer et al., 2010; Sharman et al., 2015). Thus, it could be argued that the APMS dataset in fact excludes those veterans facing the greatest challenges during transition and those groups who may be more vulnerable to problem gambling (Bramley, Norrie, & Manthorpe, 2017).

Obviously, the 2007 APMS includes a relatively small sample of Armed Forces veterans, and we should be cautious here about drawing conclusions based on a small sample size. However, one of the strengths of the APMS is that it is a large, nationally representative survey of community dwelling adults. Previous research with it has found meaningful differences in financial management between gamblers and nongamblers emerged when variables were analyzed categorically by no-risk, at-risk, and problem gambler status (Wardle et al., 2012). This method of analysis was inappropriate for the current study given the number of eligible Armed Forces veterans included in the APMS and the relatively low number of those who reported having gambled. As a consequence, because the sample size of the present study was relatively small, the results should be interpreted with caution; further replication with a larger UK dataset is warranted (Orford et al., 2010).

The above notwithstanding, in more than a decade since the 2007 APMS data were collected, several significant changes have taken place, most notably the introduction of the DSM-5 (American Psychiatric Association, 2013). In the *DSM-5*, *Pathological Gambling* was replaced with *Gambling Disorder* and moved from Impulse-Control Disorder Not Elsewhere Classified to Substance-Related and Addictive Disorders and the diagnostic threshold was lowered from five out of ten to four out of nine (the “illegal acts” requirement was removed). Given this, the absence of gambling related questions from the most recent 2014 APMS (McManus et al., 2016) presents challenges to future research on gambling prevalence

in vulnerable groups in the UK. Effectively, there currently exists no community survey data that includes both gambling and Armed Forces variables since 2007.

This study represents a preliminary exploration of the nature and extent of problem gambling in a small sample of UK veterans. Because of the secondary nature of the APMS dataset, we are unable to draw definitive conclusions about the mechanisms underlying the observed relationship between veteran status and problem gambling. Previous research has suggested problem gambling in veterans constitutes a method of relieving the dysphoric symptoms of mental health disorder (Whiting et al., 2016). Other studies have shown that veterans who have been exposed to violent combat, encountered high levels of human trauma, or killed another person are more likely to engage in risk-taking behaviour (Killgore et al., 2008). Indeed, increased risk-taking has also been reported in army reservists (Thandi et al., 2015). It is possible then that this propensity for risk-taking may increase Armed Forces veterans’ vulnerability to developing gambling problems, among other factors. Further research is therefore needed to improve our understanding both of the mechanisms underlying problem gambling risk in Armed Forces personnel and the consequences of increased availability of opportunities to gamble on problem gambling (Gainsbury et al., 2015).

The finding of a significant difference between veterans and non-veterans in rates of problem gambling, particularly when the data were obtained at a time (2006–2007) when the threshold for *DSM*-based diagnosis was higher, demonstrates the necessity for an up-to-date community survey measuring problem gambling amongst both Armed Forces and civilian populations. Further survey-based research should employ a larger sample of veterans than that available from the APMS (e.g., Stefanovics, Potenza, & Pietrzak, 2017) and include questions on pre-service mental health (inclusive of both common mental disorders and severe mental disorders with appropriate rating scales) and details of participants’ Armed Forces careers (e.g., Kraus et al., 2019). Moreover, there is potential for other approaches such as qualitative research of the lived experience of gambling problems (e.g., Miller, Thomas, & Robinson, 2018; Wardle, 2019) to further inform the understanding of military psychological health and gambling.

In terms of implications for clinical assessment and intervention, these findings suggest that the systematic prescreening for gambling related problems prior to



enrolment, the development of educational initiatives to increase awareness of gambling related harm by health professionals supporting veterans and active service personnel, and the wider adoption of evidence-based gambling treatment programs may be warranted. It may also be informative for future treatment development to consider factors whereby veterans and non-veterans progress from “at risk” to “problem gambler” categories and what role, if any, pre- or post-deployment support plays in mitigating gambling severity.

## Conclusions

These findings demonstrate different rates of problem gambling between Armed Forces veterans and matched civilian controls in a 2007 community-dwelling sample (Dighton et al., 2018; Roberts et al., 2017). To consolidate and extend these findings, further up-to-date research is required with larger samples which specifically targets problem gambling and Armed Forces experience in the UK population using contemporary diagnostic criteria.

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## Conflict of interest

All authors declare no conflict of interest.

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