Gambling problems predict suicidality in recently transitioned military veterans

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Abstract

Objective: This study investigated associations between gambling problems and suicidality in Australian veterans.

Methods: Data drawn from n = 3,511 Australian Defence Force veterans who had recently transitioned to civilian life. Gambling problems were assessed using the Problem Gambling Severity Index (PGSI) and suicidal ideation and behaviour were assessed using items adapted from the National Survey of Mental Health and Wellbeing.

Results: At-risk gambling and problem gambling were associated with increased odds of suicidal ideation [at-risk gambling: odds ratio (OR), 1.93; 95% confidence interval (CI), 1.47–2.53; problem gambling: OR, 2.75; 95% CI 1.86–4.06] and suicide planning or attempts (at-risk gambling: OR, 2.07; 95% CI, 1.39–3.06; problem gambling: OR 4.22, 95% CI, 2.61–6.81). The association with total scores on the PGSI and any suicidality was substantially reduced and became non-significant when controlling for the effects of depressive symptoms, but not financial hardship or social support.

Conclusions: Gambling problems and harms are important risk factors for suicide in veterans, and should be recognised in veteran-specific suicide prevention policies and programs, along with co-occurring mental health problems.

Implications for public health: A comprehensive public health approach to reducing gambling harm should feature in suicide prevention efforts in veteran and military populations.

Keywords: suicidality, veteran, military, gambling

Gambling problems predict suicidality in military veterans

Military veterans are highly vulnerable to death by suicide,[1] with research from Australia suggesting that the period following the transition (i.e., separation) from the military is characterised by greatly increased vulnerability.[2] During the transition period, veterans typically experience major changes across life domains including personal identity, social networks, finances, routines, and family roles. While the majority of Australian veterans adjust well to civilian life, a significant minority experience significant mental health and psychosocial difficulties, which may be implicated in their elevated risk of suicide.[2,3]

The transition from military to civilian life is also characterised by changed exposures to hazardous products and environments that permeate the community, including the products, services, and marketing practices of the gambling industry. These gambling products include high-intensity electronic gambling machines (EGMs), or 'pokies', which are heavily concentrated in Australian jurisdictions, and are unusually (by international standards) situated in local venues throughout the community, except West Australia.[4] These include

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venues of The Returned & Services League (RSL) of Australia, for example, which is the country's largest ex-service organisation comprising a federated structure involving local subbranches that are often providers of EGMs. These machines are additional to many other gambling products that are available in the Australian community, including lotteries, casino table games, and online betting services. The latter are extensively promoted by the industry with analyses of marketing in Victoria indicating 948 gambling advertisements broadcast daily on free-to-air television in 2021, which does not include exposures via gambling sponsorship of sporting clubs or events, or on social media. When viewed from a public health perspective, these gambling environments and industry practices comprise major drivers of gambling behaviours and harms, which can interact with the vulnerabilities of individuals and groups, including veterans, to produce negative consequences across individual, family, and societal levels.[5,6]

Available studies support the assertion that veterans are at high risk of gambling harm,[7,8] which may have important roles in their risk of suicide. Such studies have typically used standardised measures of gambling problems, which include questions about both maladaptive gambling behaviours (e.g., betting more than you can afford to lose) and associated harms or negative consequences (e.g., major financial losses and relationship difficulties).[9] Gambling problems can be conceptualised as falling along a continuum of severity that extends from significant gambling-related disorders, often referred to as 'problem gambling', to subclinical difficulties that may be described in terms of 'at-risk gambling'.[10] Recent epidemiological studies have identified around 8% of military personnel from Australia report gambling problems across a spectrum in the period following operational deployment,[7] while the past year prevalence is 13.4% among recently transitioned veterans.[8] These rates are seemingly higher than levels observed in representative studies of military personnel or veterans from other international jurisdictions, such as the US (which are often closer to 2%),[11] which is likely due in part to the high levels of availability and exposure to gambling products and marketing in Australia.

Studies of civilian populations have documented strong and consistent associations between gambling problems and various indicators of suicidality.[12] These associations may be attributed to the significant financial stressors and debts that can result from gambling losses, which may intersect with mental and substance use disorders that commonly co-occur in people affected by gambling harm.[13] However, only a handful of US studies have reported on links with veteran suicide and gambling and none have explored these relationships in depth.[11,14–16] Accordingly, the main aim of this study was to examine associations between gambling problems and suicidality in a cohort of recently transitioned Australian Defence Force (ADF) veterans. Suicidality predominantly precedes future completed suicides; therefore, research on suicidal ideation, plans and attempts is critical to identify factors that may prevent completed suicides. Previous analyses of data from this cohort have considered the prevalence of gambling problems among transitioned veterans and have demonstrated associations with trauma.[8] In contrast, the current study will answer:

1. What are the associations between gambling problems across a continuum of severity and suicidality in veterans who have recently transitioned to civilian life?
2. Do financial difficulties, depression, and social support have potential explanatory roles in the relationship between gambling problems and suicidality in veterans?

Method

Study population and procedure

The current study used cross-sectional data from a cohort of recently transitioned ADF members. The methodology is described in detail elsewhere.[2] All ADF members who ceased full-time regular military service between 2010 and 2014 were eligible for inclusion in this cohort. Of the 24,932 individuals who were eligible, 958 (3.8%) opted out of being contacted or did not have useable contact details. The remaining 23,974 individuals were invited by email to complete a 60-min online self-report survey. Participants could also choose to have a hardcopy of the survey sent to them via post. From these, 4,326 individuals completed the survey, which represented a response rate of 18.0%. Participants who were missing data (after imputation) on the Problem Gambling Severity Index (PGSI) were excluded, resulting in a final analytic sample of $n = 3,511$ participants. Figure 1 describes the participant flow for the study. The original project has ethical approval from the DDVAHREC (Wellbeing Study: Protocol Number: E014_018).

Measures

The survey comprised measures of socio-demographics and ADF-related characteristics, including service branch, rank, duration of service, current serving status (reservist or ex-serving), years since transition from the ADF, and whether participants had been on operational deployment.

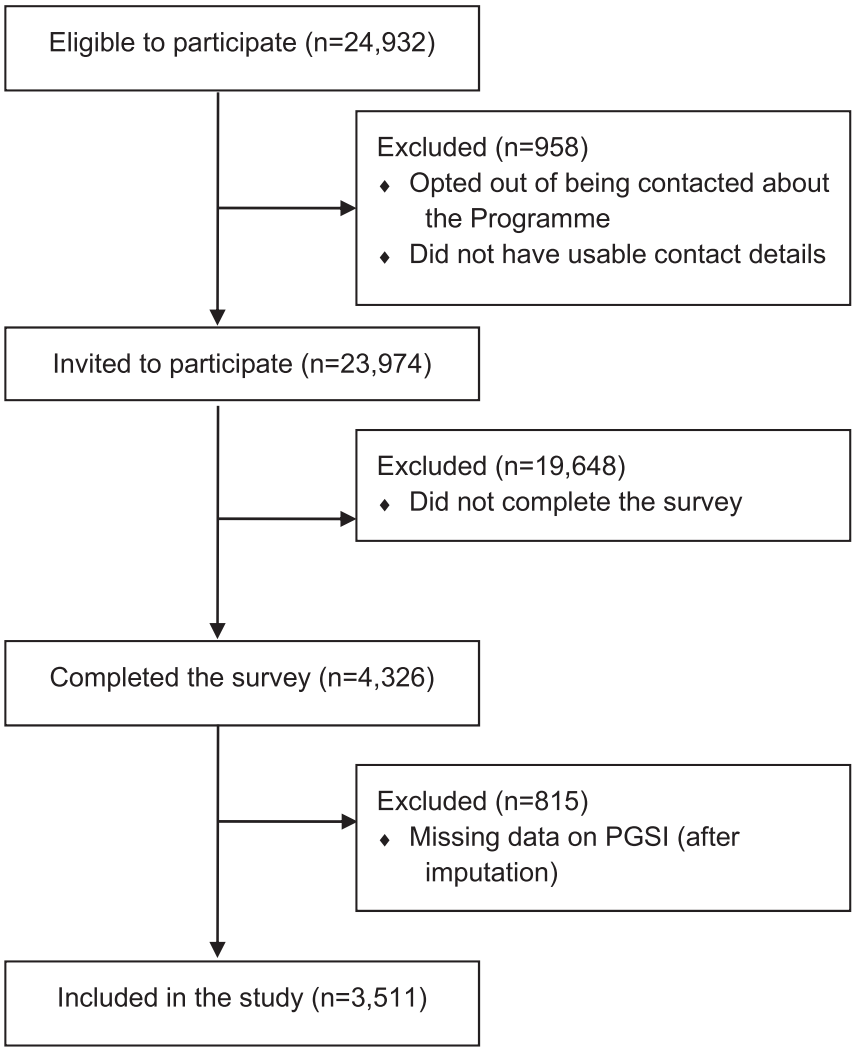
Suicidal ideation and behaviour

Suicidal ideation and behaviour during the previous year were assessed using four 'yes-no' items that referenced experiences over the last 12 months: (1) have you ever felt that your life was not worth living? (2) have you ever felt so low that you thought about committing suicide? (3) have you made a suicide plan? and (4) have you attempted suicide? Items 2–4 were adapted from the Australian 2007 National Survey of Mental Health and Wellbeing, which in turn derived them, with minor changes, from the suicidality module of the World Mental Health Survey Initiative version of the Composite International Diagnostic Interview.[17,18] Item 1 was developed by the investigators. For purposes of the current analyses, 'any suicidality' was defined as a positive response to any item. 'Suicidal ideation' was defined as a positive response to item 2. 'Suicidal planning or attempts' were defined as a positive response to item 3 or 4.

Gambling problems

Gambling problems were assessed using the 9-item PGSI, which consists of questions addressing the frequency of maladaptive gambling behaviours and consequences, rated on a four-point Likert scale ranging from 0 ('never') to 3 ('almost always').[19] The PGSI has high internal consistency ($\alpha = .90$) and strong associations with other measures of gambling problems.[20] Consistent with previous research, 'no gambling problems' was defined as a score of 0 on the PGSI,[10] 'at-risk gambling' as a score of 1−4, and 'problem gambling' as a score of ≥5. This scoring system aligns with the approach used in recent studies of Australian military personnel[7,8] and is based on

Figure 1: Participant flow diagram.



psychometric studies, which indicated that a threshold of ≥5 for problem gambling on the PGSI is associated the highest levels of classification accuracy relating to clinician ratings.[20]

Depressive symptoms

Depressive symptoms were assessed using the nine-item depression module of the Patient Health Questionnaire (PHQ-9).[21] The PHQ-9 assesses the presence or severity of the nine criteria for major depressive disorder over the previous 2 weeks. Items are rated on a four-point Likert-type scale from 0 ('not at all') to 3 ('nearly every day'). It is a widely used screening instrument for depression in non-clinical populations. Using a cut-off score of ≥10, it has a sensitivity of 77% and a specificity of 85% for detecting major depressive disorder according to DSM-IV criteria.[22]

Social support

Social support from family and friends was assessed using an adapted version of the Schuster Social Support Scale.[23] This scale assesses the frequency of supportive interactions and negative interactions with others. Supportive interactions were assessed by questions about how often family or friends made the participant feel cared for and how often they expressed interest in how the participant was doing. Negative interactions were assessed by questions about how often family or friends made too many demands on the participant, how often they criticised them, and how often they created tensions or arguments. Participants rated the frequency of these five types of interactions on a four-point Likert-type scale from 'often' to 'never'. Scores on the five items were summed to create overall measures of social support from family and social support from friends.

Current financial hardship

The presence of current financial hardship was assessed using a single, binary item drawn from the Health and Wellbeing Survey of Serving and Ex-Serving Personnel of the United Kingdom Armed Forces.[24] Participants were asked whether they were currently having any problems paying money they owed (including, for instance, loans from family or friends, credit cards, bank loans, utility bills, rent, or mortgage repayments).

Statistical analysis

Data management and preliminary exploration was performed using SPSS (version 25), while subsequent analyses were performed using

MPlus (version 8). The former initially involved screening to determine the extent of missing data (for instance, due to item non-response), with mean imputation of data performed for up to two missing items on the PHQ-9, and one missing item on the PGSI. Higher levels of missing data were addressed through pairwise deletion. To characterise the study population, frequencies were calculated for each of the key measures. Continuous variables such as age and time served in the ADF were separated into bins and frequencies calculated for each bin. The relationship between gambling problems and suicidality in the study population was then examined in two stages. In Stage 1, binary logistic regression analyses were used to explore whether at-risk gambling (compared with no gambling problems) and problem gambling (compared with no gambling problems and at-risk gambling) predicted suicidal ideation or suicidal planning or attempts. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for each regression model. In Stage 2, a series of logistic regression analyses were also used to explore whether three factors (depressive symptoms, social support, and current financial hardship) could potentially account for the relationship between gambling problems and suicidality. For purposes of this stage of analyses, total PGSI scores were specified as the primary explanatory variable to maximise variability. Four separate regression models were then tested, which all included any suicidality as the outcome variable. In Model 1, total PGSI scores, sociodemographic variables (age, sex, relationship status, and highest level of education) and ADF-related variables (service branch, rank, serving status, and history of deployment) were included as independent variables. Subsequent models then tested the effects of adding an alternative independent variable (or set of variables) to this model, including PHQ-9 scores (Model 2), social support (Model 3), and current financial hardship (Model 4). The threshold for statistical significance was set at $p < 0.05$.

Results

Characteristics of study population

Table 1 shows the sample characteristics, including sociodemographic and ADF-related characteristics, as well as rates of suicidality, gambling problems, probable major depressive disorder, and current financial hardship. There were $n = 757$ participants (21.6%) who reported experiencing suicidal ideation over the previous year, and $n = 285$ (7.9%) reported suicide planning or attempts. As reported previously, there were $n = 286$ participants (8.2%) who reported PSGI scores in the range for at-risk gambling, while $n = 134$ participants (3.8%) scored in the range for problem gambling.

At-risk and problem gambling as predictors of suicidality

Table 2 displays the results of logistic regression analyses of associations involving at-risk and problem gambling and suicide-related outcomes. As shown, at-risk gambling, when compared with no gambling problems, was associated with around two-fold increase in the odds of suicidal ideation (OR = 1.93, p <0.001), as well as suicidal planning or attempts (OR = 2.07, p <0.001). Problem gambling, compared with no gambling problems, was associated with a nearly three-fold increase in the odds of suicidal ideation (OR = 2.75, p <0.001), and a near four-fold increase in the odds of suicidal planning or attempts (OR = 4.22, p <0.001). There were 43.9% of veterans who reported PGSI scores suggesting problem gambling who also reported suicidal ideation, while 19.5% of veterans who reported scores suggesting problem gambling also reported past year suicide planning or attempts.

Total PGSI score and psychosocial variables as predictors of suicidality

Table 3 summarises findings from logistic regression models, which examined whether total PGSI scores predicted any suicidality, when controlling alternatively for the effects of PHQ-9 scores, social support from family and friends, and current financial hardship. Model 1 provides a baseline and shows that total PGSI scores were significantly associated with any suicidality when just controlling for sociodemographic and ADF-related variables (OR = 1.14, p <0.001). Total PHQ-9 scores (Model 2: OR = 1.26, p <0.001) and current financial hardship (Model 3: OR = 3.39, p <0.001) also predicted any suicidality adjusting for total PGSI scores and sociodemographic and ADF-related variables. Increased scores on measures of social support from family (OR 0.84, p <0.001) and from friends (OR 0.83, p <0.001) in Model 4 were each uniquely associated with decreased odds of any suicidality, when adjusting for variables in Model 1. The relationship between total PGSI scores and any suicidality was modestly reduced but remained significant when controlling for the effects of support from family and friends (OR 1.10, p <0.001), and current financial hardship (OR 1.11, p <0.001). In contrast, the associations between total PGSI scores and any suicidality were reduced and were no longer significant when controlling for total PHQ-9 scores (OR 1.03 $p = 0.208$).

Discussion

This study examined cross-sectional predictors of suicidality in a cohort of recently transitioned veterans from Australia and considered associations with gambling problems measured using the PGSI. This scale identifies individual conditions that are reflected in reports of maladaptive gambling behaviours and some negative consequences, which fall across a continuum of severity including subclinical difficulties (at-risk gambling) and clinically significant gambling-related conditions (problem gambling). The PGSI does not provide a comprehensive measure of all gambling harms or make visible the gambling products or environments that are drivers of such consequences. Notwithstanding these limitations of available measures, the study provided new evidence that past year gambling problems were associated with suicide-related outcomes and thus demonstrates the likely implications of these gambling products and environments for Australian veterans. Specifically, veterans who reported at-risk gambling demonstrated around two-fold increase in the odds of both suicidal ideation and suicidal planning or attempts over the previous year, when compared with veterans who reported no gambling problems. Furthermore, veterans who reported problem gambling exhibited near three-fold increase in the odds of suicidal ideation and more than four-fold increase in the odds of suicidal planning or attempts. Strikingly, 43.9% of veterans who reported problem gambling reported suicidal ideation, while nearly one in five who reported problem gambling also reported suicidal planning or attempts. While veteran populations as a whole are at greater risk of suicidality, these rates observed among veterans who report gambling problems were exceptionally high.

The analyses also examined factors that could potentially explain the relationship between gambling problems and suicidality and found

Table 1: Characteristics of study population (n = 3,511).

	n	%
Female sex	551	15.7
Ages (years)		
18—27	340	9.8
28—37	978	28.1
38—47	911	26.2
48—57	755	21.7
≥58	497	14.3
Relationship status		
Not in a relationship	671	19.3
In a relationship not living together	229	6.6
In a relationship and living together	2,578	74.1
Highest level of education		
Primary or high school	787	22.6
Certificate or diploma	1,664	47.7
University degree	1,036	29.7
Service branch		
Army	1,971	56.1
Navy	699	19.9
Air Force	841	24.0
Rank		
Commissioned officer	1,094	31.2
Non-commissioned officer and other ranks	2,417	68.8
Time served in regular ADF (years)		
0—4	388	11.2
5—9	786	22.7
10—19	892	25.8
20+	1,390	40.2
Serving status		
Reservist	2,172	61.9
Ex-serving	1,328	37.8
Years since transition		
0	309	8.8
1	699	19.9
2	671	19.1
3	706	20.1
4	538	15.3
≥5	434	12.4
Has been on deployment	2860	81.5
Suicidality		
No suicidality	2,469	70.3
Suicidal ideation	757	21.6
Suicidal planning or attempts	285	7.9
Gambling problems		
No gambling problems	3,091	88.0
At-risk gambling	286	8.2
Problem gambling	134	3.8
Probable major depressive disorder	1,037	29.5
Current financial hardship	612	17.4

Notes: This table shows the characteristics of the study population according to the study measures. 'No gambling problems' was defined as a PGSI score of 0, 'at-risk gambling' was defined as a score of 1—4 and 'problem gambling' was defined as a score of ≥5. 'Probable major depressive disorder' was defined as a PHQ-9 score of ≥10.

Abbreviations: ADF, Australian Defence Force; PGSI, Problem Gambling Severity Index; PHQ-9, Patient Health Questionnaire-9.

modest reductions in the magnitude of this association when controlling for effects of social support and financial hardship. In contrast, the association between gambling problems and suicidality was substantially reduced when controlling for depressive symptoms. These results suggest that gambling problems may contribute to suicide risk in veterans indirectly via depressive symptoms, which in turn may lead to suicidal ideation and behaviour. It is important to note, however, that this study is cross-sectional and cannot determine the causal processes underlying associations. Suicide risk likely results from a complex interaction of factors and diverse pathways, while research has also not clearly identified factors leading to progression from suicide ideation to attempts.[25] However, the current findings suggest that gambling problems and harms may be critical factors to consider in conjunction with mental health problems, including depressive symptoms, which may function as 'proximal' predictors of suicidality in a chain of factors that probably still includes financial hardship and reduced social support, as well as shame and guilt. It is also plausible that at least some of the association with suicidality is attributable to depressive symptoms that precede gambling problems. This highlights the need for research using longitudinal methods that can unpack presumably complex relationships involving gambling problems, depression, and suicidality, and potentially other co-occurring factors (e.g., financial problems, shame, alcohol problems).

Strengths and limitations

This study had several important strengths. The study population was large and represented nearly 20% of all veterans who separated from the ADF over a 5-year period. The study also used well-validated psychometric instruments. Finally, the analyses controlled for effects of potential sociodemographic and service-related confounders and explored a range of factors that may underlie the association between gambling problems and suicidality. However, the findings should also be viewed in relation to key limitations. As noted previously, the study was cross-sectional in design and does not indicate the direction of causality among variables, while the PGSI does not include questions about all types of gambling harms, or the forms of gambling which make visible the products or environments that are drivers of such harms. As far as we know, this is the first study to explore potential factors that may account for links with gambling problems and suicidality among veterans, and the findings should be considered as preliminary and viewed in relation to methodological limitations. These include the imperfect properties of the measure of financial hardship, which was operationalised by a single-item measure. Furthermore, given that 82% of eligible participants did not respond to the invitation to participate, the results may have been affected by non-response bias. Other mental health problems, such as PTSD and anxiety, may also contribute to the relationship between gambling problems and suicidality. Finally, the study population comprised recently transitioned ADF members, and the findings may not be generalisable to older veterans or veterans from other countries.

Implications for public health

The finding that gambling problems are strongly associated with suicidality among veterans aligns with studies of civilian populations[26] and has implications for the continued development of tailored suicide prevention strategies. These may build on major efforts in recent years to address veteran suicides in Australia, which have been reflected in the establishment of an Interim National Commissioner for Defence and Veteran Suicide Prevention, and the Royal Commission into Defence and Veteran Suicide, which have both

Table 2: Logistic regression models exploring whether at-risk gambling and problem gambling predicted suicidality.

Suicidality	No gambling problems ($n = 3091$)		At-risk gambling ($n = 286$)		Problem gambling ($n = 134$)		Regression models									
	(0)		(1)		(2)		(0) vs (1)				(0) vs (2)				(1) vs (2)			
	n	%	*n*	%	*n*	%	OR	LB	UB	*p*-value	OR	LB	UB	*p*-value	OR	LB	UB	*p*-value
Suicidal ideation	622	21.9	88	35.2	47	43.9	1.93	1.47	2.53	<0.001***	2.75	1.86	4.06	<0.001***	1.43	0.90	2.26	0.130
Suicidal planning or attempts	225	7.3	34	12.0	26	19.5	2.07	1.39	3.06	<0.001***	4.22	2.61	6.81	<0.001***	2.04	1.13	3.68	0.017*

Abbreviations: OR, odds ratio; LB, lower bound in 95% confidence interval; UB, upper bound in 95% confidence interval.
*** = $p < 0.001$, ** = $p < 0.01$, * = $p < 0.05$.

been oriented towards informing prevention and early intervention approaches.[27] Although the aetiology of gambling harms among Australian veterans remains poorly understood, including both individual and contextual drivers of gambling harms, the current findings suggest that gambling problems and environments are essential to consider as part of these veteran-focused suicide prevention and intervention initiatives.

In the context of broader strategies for reducing veteran suicide, there is likely value in adopting a comprehensive public health approach to gambling, which involves multilevel initiatives targeting individual and environmental drivers of gambling harm. At the individual level, relevant initiatives may comprise problem gambling treatment programs that are embedded in veteran-specific mental health services, along with programs to increase military cultural competence, and capacities to manage suicide risk among veterans encountered in community-based gambling help services. There may also be value in campaigns that increase service provider awareness of gambling problems and harms among veterans, as well as their treatment options, along with education programs for military personnel approach the transition period that should focus on understanding gambling environments and industry practices, and promote early engagement with support services.

Strategies for addressing environmental drivers of gambling harms are also essential and should focus on reducing veteran exposures to hazardous products and marketing practices across physical venues and online environments. These strategies should be developed mindful of the significant revenues that providers of gambling products derive from consumers who report gambling problems; for example, analyses of international datasets estimate 30–40% of all gambling revenue is derived from consumers classified in terms of at-risk or problem gambling (due to tendencies to gamble frequently and lose large amounts), with figures above 75% for specific products (such as EGMs) and jurisdictions.[28] This creates a financial disincentive for gambling providers to substantially reduce harm and is a reason why measures which are mostly advocated by the gambling industry (e.g., that promote self-regulation and 'responsible gambling' discourses that shift attention towards individuals, and away from hazardous products) are heavily criticised in the public health field as weak or ineffective.[5,29,30] Policies at this level should instead be modelled on regulatory interventions that have proven successful in other areas, such as tobacco control; for example, which involved creation of smoke-free environments and restrictions on the ability of the tobacco industry to market its products.[31,32] As applied to gambling, comparable policies relating to gambling-free environments would require organisations that provide social spaces for veterans (including ex-service organisations) to remove gambling products from venues, with support available for the development of alternative revenue streams. Regulatory interventions that focus on reducing exposures to gambling marketing in broader (non-veteran specific) contexts are also important, and this includes advertising in sports or on social media which often targets young men[33] who also comprise the majority of transitioned veterans. Restrictions on advertising have also been proposed to reduce exposures to gambling and the risk of future harm in other groups, including children,[34,35] and this highlights the broader benefits of such population-level interventions, which include but are not limited to reductions in suicide risk among veterans that may be due to gambling behaviours and environments.

Table 3: Logistic regression models exploring whether total PGSI score predicted any suicidality and effects of controlling for potential psychosocial mediators.

Predictor	Model 1				Model 2				Model 3				Model 4			
	OR	LB	UB	*p*-value	OR	LB	UB	*p*-value	OR	LB	UB	*p*-value	OR	LB	UB	*p*-value
PGSI total score	1.14	1.09	1.18	<0.001***	1.03	0.98	1.08	0.208	1.10	1.06	1.15	<0.001***	1.11	1.06	1.15	<0.001***
PHQ-9 total score	-	-	-	-	1.26	1.24	1.28	<0.001***	-	-	-		-	-	-	-
Social support from family	-	-	-	-	-	-	-	-	0.84	0.81	0.86	<0.001***	-	-	-	-
Social support from friends	-	-	-	-	-	-	-	-	0.83	0.80	0.87	<0.001***	-	-	-	-
Current financial hardship	-	-	-	-	-	-	-	-	-	-	-	-	3.39	2.79	4.13	<0.001***

Notes: In all models, PGSI total score, sociodemographic variables (age, sex, relationship status and highest level of education) and ADF-related variables (service branch, rank, serving status and history of deployment) were included as independent variables. Model 2 additionally adjusted for PHQ-9 total score. Model 3 additionally adjusted for social support from family and social support from friends. Model 4 additionally adjusted for current financial hardship.

Abbreviations: PGSI, Problem Gambling Severity Index; PHQ-9, Patient Health Questionnaire-9; OR, odds ratio; LB, lower bound in 95% confidence interval; UB, upper bound in 95% confidence interval.

*** = $p < 0.001$

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Declaration of competing interest

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