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Mental Disorders, Comorbidity and Pre-Enlistment Suicidal Behavior among New Soldiers in the US Army: Results from the Army Study to Assess Risk and Resilience in Service members (Army STARRS)

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Abstract

We examined the associations between mental disorders and suicidal behavior (ideation, plans, and attempts) among new soldiers using data from the New Soldier Study (NSS) component of the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS; *n*=38,507). Most new soldiers with a pre-enlistment history of suicide attempt reported a prior mental disorder (59.0%). Each disorder examined was associated with increased odds of suicidal behavior (ORs=2.6–8.6). Only PTSD and disorders characterized by irritability and impulsive/aggressive behavior (i.e., bipolar disorder, conduct disorder, oppositional defiant disorder, and attention-deficit/hyperactivity disorder) predicted unplanned attempts among ideators. Mental disorders are important predictors of pre-enlistment suicidal behavior among new soldiers and should figure prominently in suicide screening and prevention efforts.

Suicide is a leading cause of death in the US and worldwide (Nock et al 2012) and has become an especially alarming problem among US Army soldiers. The Army suicide rate

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has increased dramatically over the past decade and has surpassed that of the demographically matched general population (Nock et al 2013). The Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) was designed specifically to obtain a better understanding of the risk and resilience factors that influence suicidal behavior (Ursano et al 2014a). A recent report from Army STARRS that used a representative sample of active duty Army soldiers revealed that most non-lethal suicidal behavior (i.e., suicide ideation, plans, and attempts) that has occurred among active duty soldiers has an age-of-onset (AOO) *prior* to their enlistment in the Army (Nock et al 2014). Those findings were based in most cases on long-term retrospective recall, which can be susceptible to biases or errors in reporting (Moffitt et al 2010). However, a recent follow-up report using data collected from soldiers during their first week of Basic Combat Training found similar pre-enlistment rates of suicide ideation (14.1%), plans (2.3%) and attempts (1.9%) (Ursano et al 2014b).

The current paper extends these earlier studies by examining the predictive associations between mental disorders and the subsequent onset of pre-enlistment suicidal behavior (i.e., ideation, plans, and attempts) among new soldiers. Prior studies have established that mental disorders represent important risk factors for suicidal behavior in both civilian and military samples (Bachynski et al 2012, Bridge et al 2006, Hyman et al 2012, Nock et al 2008b, Ramsawh et al 2014, Yacobi et al 2013). Here we examine the extent to which the presence, type, and number of prior mental disorders are predictive of the subsequent first onset of suicide ideation, as well as the extent to which they predict the transition from suicide ideation to suicide plans and attempts that occur prior to enlistment.

METHOD

Sample

The sample is from the Army STARRS New Soldier Study (NSS), which is composed of 38,507 new recruits attending Basic Combat Training (BCT) at Fort Benning, GA, Fort Jackson, SC, and Fort Leonard Wood, MO between April 2011 and November 2012. Weekly samples of 200–300 soldiers were selected at each installation and asked to appear at a study overview and informed consent session. The overview and informed consent session explained the study purpose, confidentiality, and the voluntary nature of the study. Participating soldiers provided written informed consent to: (i) complete a self-administered questionnaire (SAQ), (ii) allow linkage of their Army and Department of Defense (DoD) administrative records to their SAQ responses, and (iii) be contacted regarding future data collections. All study procedures were approved by the Human Subjects Committees of the Uniformed Services University of the Health Sciences for the Henry M. Jackson Foundation (the primary grantee), the Institute for Social Research at the University of Michigan (the organization collecting the data), and all other collaborating organizations.

All new soldiers selected to attend the informed consent session did so, virtually all (99.9%) provided consent, and most (93.7%) completed the full SAQ. Incomplete surveys were primarily due to time constraints (e.g., groups arriving late or having to leave early, individual soldiers being unable to complete the survey during the allotted time). Most soldiers who completed the survey consented to have their survey linked to their

administrative records (77.0%). All analyses used a combined analysis weight that adjusts for differential administrative record linkage consent among soldiers who completed the survey and includes a post-stratification of these consent weights to known demographic and service characteristics of the population of new soldiers attending BCT during the study period. A detailed description of NSS clustering and weighting is available elsewhere (Kessler et al 2013b).

Measures

Suicidal behavior—Pre-enlistment suicidal behaviors were assessed using a modified, lifetime, self-report version of the Columbia Suicidal Severity Rating Scale (C-SSRS) (Posner et al 2011), which inquired about the lifetime presence of suicide ideation ("Did you ever in your life have thoughts of killing yourself?" or "Did you ever wish you were dead or would go to sleep and never wake up?") and, among those who reported lifetime ideation, suicide plans ("Did you ever think about how you might kill yourself [e.g., taking pills, shooting yourself] or work out a plan of how to kill yourself?") and attempts ("Did you ever make a suicide attempt (i.e., purposely hurt yourself with at least some intention to die?"). The full NSS instrument is available online at: http://www.armystarrs.org/research_instruments. Retrospective AOO was reported categorically for onsets under 18 years of age (<13, 13–15, 16–17), and all respondents reporting less than 13 were recoded to have an AOO of 12 years of age.

Mental disorders—All respondents completed a computerized, self-administered version of the Composite International Diagnostic Interview Screening Scales (CIDI-SC)(Kessler et al 2013a), as well as a screening version of the PTSD Checklist (PCL)(Weathers et al 1993). In total, we assessed for the lifetime presence and AOO of five internalizing disorders: major depressive disorder (MDD), bipolar I-II or sub-threshold bipolar disorder (BPD), generalized anxiety disorder (GAD), panic disorder (PD), and post-traumatic stress disorder (PTSD), as well as five externalizing disorders: intermittent explosive disorder (IED), conduct disorder (CD), oppositional defiant disorder (ODD), substance use disorder (SUD; alcohol or drug abuse or dependence), and attention-deficit/hyperactivity disorder (ADHD). Diagnoses were made without DSM-IV diagnostic hierarchy or organic exclusion rules. A prior Army STARRS clinical reappraisal study found good concordance between CIDI-SC and modified PCL diagnoses and independent clinical diagnoses based on blinded Structured Clinical Interviews for DSM-IV (SCID)(First 2002), and that CIDI-SC and PCL prevalence estimates were unbiased relative to SCID estimates (χ^2_1=0.0–0.6, p=.89–.43).

Analysis methods

Discrete-time survival analysis, with person-year as the unit of analysis and a logistic link function (Efron 1988), was used to examine associations of temporally prior mental disorders with the subsequent onset of suicidal behaviors. Given that prior studies have shown that mental disorders are differentially association with different parts of the pathway to suicide, we estimated separate models predicting: suicide ideation and suicide attempt in the total sample, as well as suicide plans among ideators, suicide attempts among planners, and suicide attempts among ideators without a plan. The person-year file adjusted for variations in the reporting of AOO so that the earliest year is 12 for all respondents. Each

model adjusted for sociodemographic variables shown to be associated with suicidal behavior in an earlier study (Ursano et al 2014b), including: age, gender, ethnicity, marital status, religion, soldier and parental education, nativity, and service component (models also adjusted for site of Basic Combat Training). Survival coefficients were exponentiated to create odds ratios (ORs) with 95% confidence intervals (Halli & Rao 1992, Kaplan & Meier 1958). We also estimated population attributable risk proportions (PARPs) for each model, which represent the proportion of cases of each suicidal outcome (ideation, plan, attempts) that would be prevented if the independent variables (i.e., mental disorders) were prevented, assuming a causal association between disorders and suicidal outcomes. Given that the NSS data were both clustered and weighted, the design-based Taylor series linearization method was used to estimate standard errors (Wolter 1985). Multivariate significance was examined using design-based Wald χ^2 tests. Before conducting the analyses we excluded subjects whose age was above the 99th percentile (>34 years) yielding a final sample size for our analyses of 38,237. Statistical analyses were conducted using the software R (Version 3.0.2) (R Development Core Team 2011) with the R library *survey* (Lumley 2004, Lumley 2011) to estimate the discrete-time survival analysis models.

RESULTS

Prevalence of temporally prior disorders among those with suicidal behavior

The prevalence of mental disorders and prior suicidal behavior in the NSS sample have been reported previously (Rosellini et al 2014, Ursano et al 2014b). The current analysis revealed that 59% percent of new soldiers with a pre-enlistment history of suicide attempt report having a mental disorder that began before their first attempt. The rate of temporally prior mental disorders is slightly lower among those with suicide ideation (41%) or plan (57%). The most prevalent prior mental disorders reported among those with a history of suicidal behavior are IED and ODD, which are present in 25% and 28% of suicide attempters, respectively. Internalizing disorders such as MDD (17% of suicide attempts), GAD (14%) and PTSD (14%) are slightly less prevalent (full results available upon request).

Associations of temporally prior disorders with suicidal behavior

Bivariate survival models reveal that each of the 10 mental disorders examined is significantly associated with increased odds of subsequent suicide ideation, with ORs ranging from 2.6 (SUD) to 4.3 (MDD and BPD)(Table 1). A similar pattern of results is seen for suicide attempt, with even stronger ORs, which range from 4.0 (IED) to 8.6 (MDD). These ORs all become smaller, and in some cases nonsignificant, in models predicting suicide plans and attempts among ideators (ORs=1.2–3.1).

Associations of number of comorbid disorders with suicidal behavior

Next, we examined the association between comorbidity and suicidal behavior by estimating models in which the only substantive predictors were dummy variables for the number of mental disorders that were temporally prior to each suicidal behavior. These models reveal a strong dose-response relation between number of disorders and odds of suicide ideation and attempt. For suicide ideation, ORs increased monotonically from 3.1 for those with one disorder (relative to those with zero disorders) to 11.7 for those with seven or more disorders

(Table 2). A similar pattern is seen for suicide attempt, with ORs increasing from 4.1 to 39.8. As was the case for the associations between type of disorder and suicidal behavior, the ORs become smaller, and in some cases nonsignificant, in models predicting suicide plans and attempts among ideators. For plans among ideators, the ORs increase from 1.7 for those with one disorder to 4.8–8.9 among those with five or more disorders. For attempts among ideators (both with and without a plan), ORs increase from 0.9–1.5 for those with one disorder to 1.0–6.5 among those with five or more disorders.

Mental disorders, comorbidity, and suicidal behavior

In order to better understand the unique associations between mental disorders, comorbidity, and suicidal behavior we estimated final multivariate models that included both type and number of mental disorders as predictors of the subsequent onset of each type of suicidal behavior. Examining model coefficients for the different suicidal outcomes, we see that the most powerful effects are for the prediction of suicide ideation and attempts in the total sample, where all ORs are significant (ORs=2.7–5.2)(Table 3). The ORs are weaker but mostly still significant in the prediction of which people with ideation go on to make a suicide plan (ORs=1.4–2.5). Whereas MDD had the strongest OR in the prediction of suicide ideation (OR=3.8) and attempt (OR=5.2) in the total sample, it is not significantly associated with the transition from suicide ideation to attempt. Only five disorders predict this transition (all for unplanned attempts): BPD (OR=2.3), CD (OR=2.2), ODD (OR=1.7), ADHD (OR=1.7), and PTSD (OR=1.7).

The ORs for number of disorders are lower than 1.0 in most cases, indicating the presence of sub-additive effects of comorbidity. That is, as the number of disorders increases, the relative odds of suicidal behavior increase at a decreasing rate. This pattern is most striking in the prediction of suicide ideation and attempts in the total sample, slightly less pronounced in the prediction of suicide plans and unplanned attempts among ideators, and absent in the prediction of planned attempts among ideators.

Population attributable risk proportions

The associations described above do not take into consideration the prevalence of the different disorders or the distribution of comorbidity. Therefore, we estimated population attributable risk proportions (PARPs) to determine what proportion of cases of suicidal behavior would be prevented if mental disorders were prevented, assuming a causal association between the two. We estimate that nearly one-third of all cases of pre-enlistment suicide ideation (29.6%) and nearly one-half of pre-enlistment suicide attempts (48.8%) among new soldiers are associated with prior mental disorders. The PARPs of disorders are slightly smaller in the prediction of which people with suicide ideation go on to experience pre-enlistment suicide plans (27.4%), planned attempts (11.5%) and unplanned attempts (25.0%). To the extent that these associations are causal, this would suggest that up to 48.8% of pre-enlistment suicide attempts might have been preventable if it were possible to detect and provide timely interventions to treat all of these largely child/adolescent onset cases of mental disorders.

DISCUSSION

The results of this study must be interpreted in light of four major limitations. First, respondents may have underreported suicidal behavior or mental disorders due to embarrassment or concerns about negative impact on their military career. Prior studies have shown that potentially embarrassing behaviors tend to be underreported (Tourangeau & Yan 2007), and that most soldiers with suicide ideation and significant mental health problems do not report them in non-anonymous surveys (Warner et al 2011). Given these potential biases, the observed results should be considered conservative estimates of both the prevalence of mental disorders among those with a history of suicidal behavior and the association between mental disorders and suicidal behavior. Second, our assessment of suicidal behaviors relied on the use of brief self-report items that may not fully and accurately capture people's experience of these outcomes. For instance, prior studies suggest that many people who report having made a "suicide attempt" indicate on follow-up questions that they did not actually intend to die from their behavior (Nock & Kessler 2006). Other studies suggest there may be similar problems with the assessment of suicide planning, such that failure to endorse having made a "suicide plan" does not necessarily mean that a person has not thought about the method, place, and time of their potential suicide attempt (Anestis et al 2014). Although this study used state-of-the-art measures of suicidal behavior, it is important to keep the limitations of current assessment tools in mind when interpreting these results. Third, respondents may have inaccurately reported ages of onset of mental disorders in relation to suicidal behaviors, introducing error into our models. Fourth, we assessed only a limited number of mental disorders in this study. Prior studies have shown, for instance, that psychotic, personality and adjustment disorders are significantly associated with suicidal behavior among soldiers (Bachynski et al 2012); however, we were unable to assess the full range of disorders due to time constraints in our assessment. Similarly, we did not examine the broader range of potential risk factors for suicidal behavior in this report due to space constraints, but will do so in future papers.

These limitations notwithstanding, there are several important findings in this study. First, we found that most new soldiers who have made a pre-enlistment suicide attempt had a mental disorder prior to their first attempt. This finding is consistent with results from earlier studies conducted among civilians (Nock et al 2009, Nock et al 2010) as well as active duty soldiers (Nock et al 2014). Unlike earlier studies reporting that depression is the most common mental disorder among those with suicidal behavior, we found that among new soldiers with a pre-enlistment history of suicidal behavior, externalizing disorders such as IED and CD are most common. This diverges from what has been observed in civilian studies, but it is consistent with recent reports noting that IED is the most prevalent disorder among new Army recruits (Kessler et al 2014, Rosellini et al 2014). These findings add to a growing literature highlighting the importance of externalizing disorders in the onset of suicidal behavior (Brent et al 1999, Nock et al 2014).

Second, each disorder examined was significantly associated with elevated odds of suicide ideation and attempts – a finding that also is consistent with prior studies (Cavanagh et al 2003, Joiner et al 2005, Kessler et al 1999, Nock et al 2008a). The dose-response relation between the number of mental disorders present and the subsequent odds of suicidal

behavior also replicates findings from earlier studies (Kessler et al 1999, Nock et al 2008a, Nock et al 2009). This pattern of results suggests that the previously observed associations between mental disorders and suicidal behavior also are present among new Army recruits. Moreover, the PARPs for suicide attempt suggest that, assuming these associations are causal, providing treatment for early onset mental disorders would prevent up to half of all suicide attempts among individuals who subsequently enlist in the Army, emphasizing the importance of targeting mental disorders in suicide screening and prevention efforts. On balance, the extent to which such preventive effects might actually occur given currently available treatments, as well as uncertainties about causality, remains to be seen. We are not aware of any systematic studies that provide such early interventions and show a later decrease in the risk of suicidal behavior. This remains an important area for future study.

Third, although the presence and accumulation of mental disorders is associated with the subsequent onset of suicide ideation, multivariate analyses revealed that they are less predictive of which suicide ideators go on to make suicide plans and attempts. Interestingly, although virtually all disorders still predicted which people with suicide ideation go on to make a suicide plan (albeit with smaller ORs than observed in the total sample), not a single disorder predicts which soldiers with a suicide plan go on to make an attempt. This suggests that mental disorders may be important in the genesis of suicidal thoughts and plans, but once people progress to making a suicide plan, other factors determine whether or not they are going to act on their plan. Given that suicide attempts are so prevalent among those who make a suicide plan (Kessler et al 1999, Nock et al 2008a), the identification of risk factors for the transition from plan to attempt is an especially important direction for future studies.

In contrast to the results for planned attempts, several mental disorders were predictive of which soldiers with a history of suicide ideation later made unplanned (i.e., impulsive) suicide attempts. Interestingly, although depression was the most prevalent disorder, it had the strongest association with suicide ideation and attempts in the total sample. However, it was not predictive of which suicide ideators made a suicide attempt. Only PTSD and disorders characterized by problems with irritability and impulsive/aggressive behavior (i.e., BPD, CD, ODD, and ADHD) predicted the transition from suicide ideation to unplanned attempts. These findings diverge slightly from a recent Army STARRS study of a representative sample of active duty soldiers in which IED was the only disorder to predict suicide attempts among ideators (Nock et al 2014). However, these results are consistent with the more general pattern of findings observed in both US and cross-national civilian samples showing that depression is the strongest predictor of suicide ideation, but disorders characterized by anxiety, irritability, and impulsive/aggressive behavior predict suicide attempts among ideators (Nock et al 2009, Nock et al 2010). Given this consistent pattern of findings across studies, an important direction for future research is to determine *why* these disorders are predictive of this transition. Recent research suggests that it may not be impulsiveness that is the key psychological construct operating here, but perhaps irritability/ agitation and aggressive behavior (Keilp et al 2006, Ribeiro et al 2014). Identifying the psychological constructs that can help to explain the transition from healthy mental states to suicide ideation, and from ideation to attempt/death, will not only improve prediction, but will provide potential targets for prevention and intervention programs.

On balance, although several disorders predicted the transition from suicide ideation to unplanned attempts, the overall pattern of findings from this study, as well as other previous studies, suggest that we still know relatively little about why some ideators and planners go on to make suicide attempts. This is a critical gap in knowledge that will be addressed in other components of Army STARRS, such as Soldier Health Outcomes Studies A and B – two case-control studies of suicide attempters and decedents that examine a wide range of potential risk and protective factors well beyond mental disorders (e.g., history of adverse life events, personality characteristics, unit cohesion, social support, etc.). The identification of risk and resilience factors for suicidal behavior beyond the presence and accumulation of mental disorders represents an extremely important direction for suicide research not only among servicemembers, but for society more generally.

Acknowledgments

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Appendix

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Table 1

Survival models of the associations between mental disorders and the subsequent first onset of suicidal behavior

| | In the total sample | | | | | Among lifetime ideators | | | |
| | Suicide Ideation | | Attempt | | Plan | | Attempt among those with a plan | | Attempt among those without a plan | |
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Internalizing disorders										
MDD	4.3*	(3.8–4.9)	8.6*	(6.7–11.0)	2.3*	(1.9–2.9)	1.7*	(1.2–2.4)	1.9*	(1.2–3.0)
Bipolar disorder	4.3*	(3.5–5.2)	8.1*	(5.9–11.2)	3.1*	(2.3–4.2)	1.3	(0.7–2.3)	2.6*	(1.5–4.5)
GAD	3.8*	(3.2–4.5)	7.6*	(5.7–10.1)	2.4*	(1.9–3.1)	1.6*	(1.1–2.4)	2.0*	(1.3–3.1)
Panic disorder	3.6*	(3.0–4.3)	7.3*	(5.3–9.9)	3.1*	(2.3–4.3)	2.1*	(1.2–3.6)	1.6	(0.9–2.8)
PTSD	2.9*	(2.6–3.3)	5.4*	(4.2–7.0)	1.7*	(1.3–2.2)	1.5	(1.0–2.2)	2.0*	(1.4–2.9)
Externalizing disorders										
IED	3.0*	(2.7–3.2)	4.0*	(3.3–4.8)	1.9*	(1.6–2.3)	1.2	(0.9–1.7)	1.2	(0.9–1.7)
Conduct disorder	3.1*	(2.7–3.5)	5.8*	(4.6–7.3)	1.7*	(1.4–2.0)	1.6*	(1.1–2.5)	2.4*	(1.8–3.3)
ODD	3.6*	(3.3–3.9)	5.6*	(4.7–6.7)	1.8*	(1.5–2.1)	1.2	(0.9–1.6)	2.0*	(1.5–2.6)
Substance use disorder	2.6*	(2.2–3.1)	5.1*	(3.5–7.3)	1.8*	(1.3–2.6)	1.7*	(1.0–2.9)	1.3	(0.8–2.3)
ADHD	4.0*	(3.5–4.6)	6.1*	(4.7–8.0)	2.0*	(1.5–2.6)	1.5	(0.9–2.5)	2.0*	(1.2–3.1)

Abbreviations: MDD: Major depressive disorder; GAD: Generalized anxiety disorder; PTSD: Post-traumatic stress disorder; IED: Intermittent explosive disorder; ODD: Oppositional defiant disorder; ADHD: Attention-deficit/hyperactivity disorder; OR: Odds ratio; CI: Confidence interval.

*
Significant at the 0.05 level, two-sided test.

Each cell displays the result of a separate bivariate model including the disorder specified in the row as predictor and the suicidal behavior in the column as dependent variable, including the following covariates: age, gender, ethnicity, marital status, religion, soldier and parental education, nativity, service component, site of Basic Combat Training, and person-year.

Table 2

Survival models of the associations between the number of temporally prior mental disorders and the subsequent first onset of suicidal behavior

| | In the total sample | | | | | | Among lifetime ideators | | | |
| | Suicide Ideation | | Attempt | | Plan | | Attempt among those with a plan | | Attempt among those without a plan | |
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Exactly 1 disorder	3.1*	(2.9–3.4)	4.1*	(3.1–5.4)	1.7*	(1.4–2.1)	0.9	(0.6–1.3)	1.5*	(1.2–2.1)
Exactly 2 disorders	4.5*	(4.0–5.2)	8.4*	(6.5–10.7)	1.8*	(1.5–2.3)	1.4	(0.9–2.1)	2.2*	(1.6–3.0)
Exactly 3 disorders	6.8*	(5.8–8.0)	13.0*	(9.5–18.0)	3.4*	(2.5–4.6)	1.3	(0.8–2.1)	2.5*	(1.6–4.0)
Exactly 4 disorders	6.4*	(5.0–8.1)	23.0*	(15.8–33.5)	3.0*	(2.0–4.6)	1.8	(1.0–3.4)	6.3*	(3.5–11.3)
Exactly 5 disorders	10.8*	(7.2–16.2)	36.5*	(22.0–60.5)	6.1*	(3.7–10.0)	3.0*	(1.6–5.7)	1.0	(0.2–5.3)
Exactly 6 disorders	12.7*	(7.6–21.2)	45.9*	(24.2–86.9)	8.9*	(4.8–16.8)	2.1	(1.0–4.8)	6.5*	(2.5–17.0)
7+ disorders	11.7*	(6.1–22.1)	39.8*	(19.5–81.3)	4.8*	(2.4–9.5)	2.4	(0.8–6.8)	2.7	(0.7–10.4)
χ²[a]	1977.3*		776.8*		188.6*		16.0*		72.1*	

Abbreviations: OR: Odds ratio; CI: Confidence interval.

*
 Significant at the 0.05 level, two-sided test.

Each cell displays the result of a separate bivariate model including the number of disorders specified in the row as predictor and the suicidal behavior in the column as dependent variable, including the following covariates: age, gender, ethnicity, marital status, religion, soldier and parental education, nativity, service component, site of Basic Combat Training, and person-year.

Table 3

Multivariate survival models of the association between type/number of temporally prior mental disorders and the subsequent first onset of suicidal behavior

| | In the total sample | | | | | | Among lifetime ideators | | | |
| | Suicide Ideation | | Attempt | | Plan | | Attempt among those with a plan | | Attempt among those without a plan | |
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Internalizing disorders										
MDD	3.8*	(3.2–4.5)	5.2*	(3.7–7.3)	1.8*	(1.3–2.5)	1.1	(0.6–2.0)	1.4	(0.9–2.3)
Bipolar disorder	3.5*	(2.7–4.4)	4.4*	(2.7–7.2)	2.4*	(1.6–3.5)	0.7	(0.3–1.4)	2.3*	(1.2–4.5)
GAD	2.9*	(2.3–3.7)	3.7*	(2.2–6.3)	1.8*	(1.2–2.7)	1.0	(0.5–2.0)	1.6	(0.9–3.1)
Panic disorder	3.2*	(2.6–3.9)	4.5*	(2.8–7.2)	2.5*	(1.8–3.7)	1.5	(0.8–3.0)	1.3	(0.6–2.6)
PTSD	2.7*	(2.4–3.2)	3.8*	(2.5–5.6)	1.4	(0.9–2.0)	1.0	(0.6–1.9)	1.7*	(1.1–2.7)
Externalizing disorders										
IED	2.8*	(2.5–3.1)	2.7*	(1.9–3.9)	1.7*	(1.3–2.2)	0.8	(0.5–1.4)	1.0	(0.6–1.5)
Conduct disorder	2.7*	(2.3–3.1)	4.0*	(2.8–5.8)	1.5*	(1.1–2.0)	1.2	(0.7–2.2)	2.2*	(1.4–3.4)
ODD	3.4*	(3.0–3.9)	4.1*	(3.0–5.8)	1.7*	(1.3–2.2)	0.8	(0.5–1.3)	1.7*	(1.1–2.5)
Substance use disorder	2.7*	(2.3–3.3)	4.3*	(2.8–6.4)	1.8*	(1.2–2.7)	1.3	(0.8–2.3)	1.2	(0.7–2.0)
ADHD	3.6*	(3.1–4.2)	4.1*	(2.6–6.5)	1.7*	(1.2–2.4)	1.2	(0.6–2.1)	1.7*	(1.0–2.9)
Total										
Exactly 2 disorders	0.5*	(0.4–0.6)	0.6*	(0.3–0.9)	0.7*	(0.4–1.0)	1.5	(0.7–3.2)	0.9	(0.5–1.6)
Exactly 3 disorders	0.2*	(0.2–0.3)	0.2*	(0.1–0.5)	0.7	(0.4–1.2)	1.4	(0.5–4.1)	0.7	(0.3–1.7)
Exactly 4 disorders	0.1*	(0.1–0.1)	0.1*	(0.0–0.3)	0.3*	(0.2–0.7)	1.9	(0.4–8.6)	1.1	(0.4–3.3)
Exactly 5 disorders	0.0*	(0.0–0.1)	0.0*	(0.0–0.2)	0.4*	(0.1–1.0)	3.3	(0.6–19.7)	0.1*	(0.0–0.9)
Exactly 6 disorders	0.0*	(0.0–0.0)	0.0*	(0.0–0.1)	0.3*	(0.1–1.0)	2.2	(0.2–21.0)	0.5	(0.1–3.1)
Seven disorders or more	0.0*	(0.0–0.0)	0.0*	(0.0–0.0)	0.1*	(0.0–0.3)	2.2	(0.2–32.8)	0.1*	(0.0–0.9)
χ^2 type[a]	880.7*		146.5*		57.8*		11.8		29.0*	
χ^2 number[b]	280.0*		75.7*		17.4*		5.1		15.6*	
(n)[c]	(38,237)		(38,237)		(5,280)		(807)		(4,595)	

Abbreviations: MDD: Major depressive disorder; GAD: Generalized anxiety disorder; PTSD: Post-traumatic stress disorder; IED: Intermittent explosive disorder; ODD: Oppositional defiant disorder; ADHD: Attention-deficit/hyperactivity disorder; OR: Odds ratio; CI: Confidence interval.

*
Significant at the 0.05 level, two-sided test.

Each column represents a separate multivariate model in a survival framework, with all rows as predictors of the suicidal behavior in the column as dependent variable, including the following covariates: age, gender, ethnicity, marital status, religion, soldier and parental education, nativity, service component, site of Basic Combat Training, and person-year.

[a] χ^2 tests for significance of the set of coefficients for type of disorder net of effects of number of disorders.

[b] χ^2 tests for significance of the set of coefficients for number of disorders net of effects of type of disorders.

[c] Denominator sample size of the models.