Lifetime Prevalence of DSM-IV Mental Disorders Among New Soldiers in the U.S. Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS)

Anthony J. Rosellini, Ph.D.[1], **Steven G. Heeringa, Ph.D.**[2], **Murray B. Stein, M.D., M.P.H.**[3,4], **Robert J. Ursano, M.D.**[5], **Wai Tat Chiu, A.M.**[1], **Lisa J. Colpe, Ph.D., M.P.H.**[6], **Carol S. Fullerton, Ph.D.**[5], **Stephen E. Gilman, Sc.D.**[7], **Irving Hwang, M.A.**[1], **James A. Naifeh, Ph.D.**[5], **Matthew K. Nock, Ph.D.**[8], **Maria Petukhova, Ph.D.**[1], **Nancy A. Sampson, B.A.**[1], **Michael Schoenbaum, Ph.D.**[6], **Alan M. Zaslavsky, Ph.D.**[1], and **Ronald C. Kessler, Ph.D.**[1,*] **On behalf of the Army STARRS collaborators**

[1]Department of Health Care Policy, Harvard Medical School, Boston, MA, USA

[2]University of Michigan, Institute for Social Research, Ann Arbor, MI, USA

[3]Departments of Psychiatry and Family and Preventive Medicine, University of California San Diego, La Jolla, CA, USA

[4]VA San Diego Healthcare System, San Diego, CA, USA

[5]Center for the Study of Traumatic Stress, Department of Psychiatry, Uniformed Services University of the Health Sciences, Bethesda, MD, USA

[6]National Institute of Mental Health, Bethesda, MD, USA

[7]Departments of Social and Behavioral Sciences, and Epidemiology, Harvard School of Public Health, Boston, MA, USA

[8]Department of Psychology, Harvard College, Cambridge, MA, USA

Abstract

Background—The prevalence of 30-day mental disorders with retrospectively-reported early onsets is significantly higher in the U.S. Army than among socio-demographically matched civilians. This difference could reflect high prevalence of pre-enlistment disorders and/or high persistence of these disorders in the context of the stresses associated with military service. These alternatives can to some extent be distinguished by estimating lifetime disorder prevalence among new Army recruits.

Methods—The New Soldier Study (NSS) in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) used fully-structured measures to estimate lifetime prevalence

[*]Address correspondence to Ronald C. Kessler, Ph.D., Department of Health Care Policy, Harvard Medical School, 180 Longwood Avenue, Boston, MA 02115. Tel. (617) 432-3587, Fax (617) 432-3588, Kessler@hcp.med.harvard.edu.

of 10 DSM-IV disorders in new soldiers reporting for Basic Combat Training in 2011-2012 (n=38,507). Prevalence was compared to estimates from a matched civilian sample. Multivariate regression models examined socio-demographic correlates of disorder prevalence and persistence among new soldiers.

Results—Lifetime prevalence of having at least one internalizing, externalizing, or either type of disorder did not differ significantly between new soldiers and civilians, although three specific disorders (generalized anxiety, posttraumatic stress, and conduct disorders) and multi-morbidity were significantly more common among new soldiers than civilians. Although several socio-demographic characteristics were significantly associated with disorder prevalence and persistence, these associations were uniformly weak.

Conclusions—New soldiers differ somewhat, but not consistently, from civilians in lifetime pre-enlistment mental disorders. This suggests that prior findings of higher prevalence of current disorders with pre-enlistment onsets among soldiers than civilians are likely due primarily to a more persistent course of early-onset disorders in the context of the special stresses experienced by Army personnel.

Keywords

military personnel; mental disorders; prevalence; epidemiology; demographics

INTRODUCTION

Mental disorders are leading causes of U.S. military morbidity. [1] This high *relative* burden of mental disorders could reflect the fact that soldiers are physically healthy at the time of enlistment due to serious physical disorders being exclusions from military service, but might also be due partly to a high *absolute* burden of mental disorders in the military compared to civilians. The scant data on this issue suggest that military personnel on active duty have higher rates of some mental disorders than civilians. [2] The most rigorous study of this issue to date comes from a self-report survey, the All-Army Survey (AAS), in the *Army Study to Assess Risk and Resilience in Servicemembers* (Army STARRS). [3,4] The AAS assessed a representative sample of non-deployed U.S. Army soldiers exclusive of those in Basic Combat Training and found that prevalence of having at least one common psychiatric disorder in the 30 days before interview was considerably higher among these soldiers (25.1%) than a civilian sample calibrated to have similar socio-demographics as soldiers and not to have exclusions for enlistment (11.6%).[5] Although this higher prevalence in the Army might be due to the unique stressors associated with military service, [6-9] another possibility is that differential selection exists into military service on the basis of pre-enlistment mental disorders or risk factors for such disorders. Evaluating the relative importance of these two possibilities is important given recent discussions about optimal recruitment, retention, and health care delivery strategies for an all-volunteer Army during times of war. [10,11]

The AAS provided some limited information on this issue by asking respondents retrospectively to report the age-of-onset of their 30-day mental disorders. Three-quarters (76.6%) of respondents reported onsets prior to enlistment. This high proportion should not

be surprising, as general population epidemiological studies find most lifetime mental disorders have childhood-adolescence onsets.[12-14] But a more striking result was that a significantly higher proportion of respondents with 30-day disorders in the civilian comparison sample reported early onsets (91.2% versus 76.6%, χ^2_1=10.7, p=.001). However, *absolute* prevalence of 30-day disorders with pre-enlistment onsets was nonetheless significantly higher among soldiers than civilians (19.2% versus 10.6%, χ^2_1=10.4, p=.001).

The higher absolute prevalence of 30-day disorders with early onsets among soldiers than civilians could be due to any of three processes: (1) recall error in retrospective age-of-onset reports; (2) early-onset disorders and/or their risk factors being positively associated with Army enlistment; and (3) higher chronicity of early-onset disorders among soldiers than civilians (possibly due to the special stressors associated with Army service). The first possibility is implausible because methodological research suggests that the tendency in such dating errors is to recall first onset as more recent than actually occurred,[15] and there is no reason to think that recall error would be greater among soldiers than civilians. However, the remaining possibilities are both plausible.

Adjudication between these two possibilities could be important in helping to design Army preventive interventions, including early interventions for high-risk groups or early treatment if soldiers were found to have significantly higher rates of child-adolescent disorders than civilians. The data in the AAS did not allow for this analysis, as lifetime prevalence was assessed only among soldiers with 30-day disorders. However, useful information on this issue could be obtained by comparing lifetime prevalence of mental disorders among new Army recruits and civilians. We present the results of such a study in the current report, examining pre-enlistment prevalence and socio-demographic correlates of a number of common mental disorders.

MATERIALS AND METHODS

The sample

Data come from the Army STARRS New Soldier Study (NSS). Unlike the AAS, which did not include soldiers in Basic Combat Training (BCT), the NSS was carried out exclusively among new soldiers who had already been successful in passing the screening hurdles for Army enlistment (i.e., for histories of criminal behaviors, severe physical disorders-handicaps, and severe mental illness)[16] and were about to begin BCT at the three Army Installations (Fort Benning, GA; Fort Jackson, SC; and Fort Leonard Wood, MO) between April 2011 and November 2012. Data collection occurred during the days immediately prior to starting BCT when new soldiers were processed (e.g., completing physical exams; issuance of uniforms). Samples sizes were proportional to the relative size of the cohorts across installations. Recruitment began by selecting a weekly sample of 200-300 new soldiers in each installation to attend a study overview and informed consent presentation for the study. Army STARRS staff worked closely with Army coordinators to guarantee that these samples were representative of all new soldiers in each weekly cohort. The overview and informed consent presentation explained study purposes, confidentiality, emphasized that participation was voluntary, and answered all questions before seeking written informed

consent to (i) complete a self-administered questionnaire (SAQ), (ii) link administrative records to SAQ responses, and (iii) participate in future data collections. Identifying information (e.g., name, SSN) was collected from consenting respondents and kept in a separate secure file. These recruitment, consent, and data protection 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.

The 38,507 NSS respondents considered here represent all consenting soldiers who completed the SAQ April 2011-November 2012. All new soldiers selected to attend the informed consent session did so, virtually all (99.9%) provided consent, and most (93.5%) completed the full SAQ (see Appendix Table 5). Incomplete surveys were primarily due to time constraints (e.g., cohorts arriving late or having to leave early; certain respondents being unable to fully complete the surveys during the allotted time). Most soldiers who completed the survey also provided consent for and were successfully linked to their administrative records (77.1%). All analyses reported here utilize a combined analysis weight that both 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.[17]

The comparison civilian sample

Lifetime prevalence of DSM-IV disorders was compared to estimates from a sub-sample of the National Comorbidity Survey Replication (NCS-R)[18] limited to respondents who lacked self-reported exclusions for Army service (histories of criminal behaviors, severe physical disorders-handicaps, and severe mental illness) and was weighted to have the same multivariate distribution as the NSS on a range of socio-demographics separately among soldiers in the Regular Army and in the Army National Guard or Army Reserve. A detailed discussion of the civilian sample and calibration is presented elsewhere.[19]

Measures

Diagnostic assessment—NSS respondents self-administered a computerized version of the Composite International Diagnostic Interview screening scales (CIDI-SC)[20] and a screening version of the PTSD Checklist (PCL)[21] to assess 10 lifetime DSM-IV mental disorders. We focused on lifetime prevalence rather than 30-day prevalence because we were interested in studying differences in the rates of *any* pre-enlistment mental disorders rather than current disorders at the time of accession. The NCS-R assessed the same lifetime disorders with the full CIDI,[20] which means that between-survey comparisons of prevalence are inexact. Respondents in the NSS but not NCS-R with lifetime disorders were also asked *how many years* each disorder had been present *at least some of the time*. We examined these responses to assess persistence of pre-enlistment disorders both by studying the absolute number of years in which each disorder occurred beyond the year of onset and also the ratio of number of years in which each disorder occurred beyond the year of onset

divided by the total number of years since onset. The latter ratios were calculated at the aggregate level for each disorder to adjust for some disorders having much earlier ages-of-onset than others.[13] Although this is only a rough measure of persistence, it is nonetheless useful in providing a general sense of how often pre-enlistment disorders are persistent rather than short-lived.

We distinguished between internalizing and externalizing disorders based on empirical evidence for this distinction.[22] Five internalizing disorders were assessed: major depressive episode (MDE), bipolar I-II or sub-threshold bipolar disorder (BPD), generalized anxiety disorder (GAD), panic disorder (PD), and post-traumatic stress disorder (PTSD) along with 5 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). The SUD assessment included not only illicit drugs but also misused prescription drugs based on evidence that prescription drug misuse is considerably more common than illicit drug use in the Army.[23] Diagnoses in both surveys were made without DSM-IV diagnostic hierarchy or organic exclusion rules. As reported in detail elsewhere,[24] an 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).[25] The clinical reappraisal study also found CIDI-SC and PCL prevalence estimates were unbiased relative to SCID estimates (χ^2_1=0.0-0.6, p=.89-.43). The earlier report,[24] which included detailed concordance results for each of the 10 disorders studied here, is available elsewhere (www.armystarrs/org/publications).

Socio-demographics—Socio-demographics included respondent age, sex, race-ethnicity, soldier education, marital status, religion, soldier and parent nativity, and parent education relative to respondent education. Separate questions were asked about Hispanic ethnicity (yes-no) and race (*White, Black or African-American, American Indian or Native American, Asian [e.g., Chinese, Filipino, Indian],* and *Native Hawaiian or other Pacific Islander,* and *Other*, with responses collapsed into summary categories of Non-Hispanic Black, Non-Hispanic White, Hispanic, and Other.

Analysis Methods

Cross-tabulations were used to estimate disorder prevalence. Comparison of prevalence estimates in the NSS and the comparison civilian sample was used to determine if pre-enlistment prevalence was higher among new soldiers than civilians. Socio-demographic predictors of disorder onset and persistence were examined to determine if high pre-enlistment disorder risk was isolated in a small subset of new soldiers or widely-distributed. Logistic regression was used to predict lifetime disorders and negative binomial regression to predict disorder persistence controlling for age-of-onset and number of years since onset. Coefficients and standard errors were exponentiated in logistic models to create odds-ratios (ORs) with 95% confidence intervals and in negative binomial models to create incident rate ratios (IRRs; the expected difference in mean number of years of persistence associated with a 1 unit increase in the predictor) with 95% confidence intervals. Strength of associations was evaluated with Cramer's V (φ_c).

All analyses were carried out using weighted data. Design effects due to weighting and implicit stratification by location and clustering were handled by using the design-based Taylor series linearization method[26] to estimate standard errors. Pseudo-strata were defined to implement this method based on location and bi-weekly time windows treating each weekly time-space cluster as a separate sampling error calculation unit. Significance of predictor sets was evaluated using design-based Wald χ^2 tests. All analyses were carried out with SAS Version 9.3,[27] with *proc surveyfreq* to estimate prevalence, *proc surveylogistic* to estimate logistic models, and *proc genmod* to estimate negative binomial models.

RESULTS

Socio-demographic distributions

Distributions of socio-demographic variables in the weighted NSS Regular Army and National Guard/Army Reserve (Guard/Reserve) were comparable to those in the target population of all new soldiers. (Table 1)

Lifetime disorder prevalence

The estimated lifetime prevalence in the total NSS sample was 38.7% for any DSM- IV/CIDI-PCL disorder, 19.8% for internalizing disorder, and 31.8% for any externalizing disorders. PTSD was the most common internalizing disorder (12.6%) and intermittent explosive disorder the most common externalizing disorder (14.6%). These general patterns were very similar in the Regular Army and Guard/Reserve, although prevalence was consistently somewhat higher in the latter than former, with the Guard/Reserve having higher prevalence of any disorder (40.0% versus 37.6%; χ^2_1=14.0, p<.001), any internalizing disorder (21.0% versus 18.8%; χ^2_1=19.4, p<.001), each internalizing disorder other than BPD (3.3-13.3% versus 2.7-12.1%; χ^2_1=7.2-19.7, p<.001 to p=.007), and two externalizing disorders (IED, ADHD; 7.0-15.1% versus 5.9-14.2%; χ^2_1=4.5-9.3, p=.002-.034).

Lifetime prevalence differences between all new soldiers and the civilian sample were not significant for the aggregate variables representing any DSM-IV/CIDI-PCL disorder (38.7% versus 36.5%; χ^2_1=0.1, p=.76), any internalizing disorder (19.8% versus 20.3%; χ^2_1=0.0, p=.93), or any externalizing disorder (31.8% versus 28.8%; χ^2_1=0.2, p=.62). However, prevalence of 3 individual disorders (GAD, PTSD, CD) were significantly higher among soldiers than civilians. The differences in GAD (8.2% versus 1.2%; χ^2_1=245.0, p<.001) and PTSD (12.6% versus 2.5%; χ^2_1=44.5, p<.001) were much more striking than the difference in CD (5.9% versus 3.3%; χ^2_1=3.9, p=.048). These differences resulted in a significantly higher proportion of new soldiers than civilians having multi-morbidity (3+ lifetime disorders; 11.3% versus 6.5%; χ^2_1=4.0, p=.046). These soldier-versus-civilian differences were broadly similar when examined separately in the Regular Army and Guard/Reserve other than that prevalence of CD was not significantly higher among new soldiers in the Guard/Reserve than civilians (5.5% versus 3.6%; χ^2_1=1.6, p=.21).

Persistence of lifetime DSM-IV/CIDI-PCL disorders

Mean years of disorder persistence (exclusive of ADHD, for which persistence was not assessed) across disorders was comparable among new soldiers in the Regular Army (1.3-4.5) and Guard/Reserve (1.2-4.4). (Table 3) IED was the only disorder with mean persistence significantly different in the Regular Army than Guard/Reserve, although the difference was substantively small (3.6 versus 3.4; χ^2_1=4.9, p=.027). Persistence ratios were in the range 33.2-60.7% for the Regular Army and 31.6-62.0% for the Guard/Reserve and BPD was the only disorder with a persistence ratio that significantly differed in the Regular Army than Guard/Reserve (41.9% versus 48.3%, χ^2_1=4.9, p=.027). Persistence was generally higher for externalizing (3.4-4.5) than internalizing (1.4-3.0) disorders with the exception of SUD. It is noteworthy that the two highest persistence ratios were for PD (60.7-62.0%) and IED (57.0-58.4%), both of which are characterized by repeated and uncontrollable attacks (of fear in the case of PD and anger in the case of IED) out of proportion to precipitating events.

Socio-demographic predictors of prevalence and persistence

The vast majority of associations between socio-demographics and lifetime disorders were statistically significant in multivariate models, including 22 of 24 in pooled models (Table 4) and 51 of 80 in models for individual disorders. (The tables for individual disorders are available at (www.armystarrs/org/publications). These associations were for the most part in the direction predicted by previous research: higher rates of internalizing disorders among women and soldiers with Non-Western religions; higher rates of externalizing disorders among men and the unmarried; and inverse associations of age, minority status (Non-Hispanic Black and Hispanic), soldier and parent education, and immigrant status with both internalizing and externalizing disorders. However, these statistically significant associations were all small in substantive terms (φ_c in the range .00-.07).

The associations of socio-demographics with disorder persistence were less consistent: 16 of 27 associations in pooled models and 29 of 81 in models for individual disorders. Persistence was higher among women than men and Non-Hispanic Whites than minorities (only for externalizing disorders), lower among immigrants than 1st and later generation Americans, and inversely related both to age-of-onset and to time-since-onset. Parent education was related inversely to persistence of internalizing disorders and positively to persistence of externalizing disorders. Religion, soldier education, and marital status were unrelated to persistence. As with prevalence, the statistically significant associations with persistence were small in substantive terms (φ_c in the range .02-.09) other than those involving age-of-onset and time-since-onset (φ_c in the range .06-.27).

DISCUSSION

The above results are important in demonstrating that new soldiers in the U.S. Army during 2011-2012, although having higher rates of GAD, PTSD, CD, and multi-morbidity than civilians, did not differ significantly from otherwise comparable civilians in lifetime prevalence of having at least one earlier-onset mental disorder (38.7% of new soldiers versus 36.5% of respondents in the calibrated civilian sample). While this rate of disorders might

seem high at a superficial level, it is important to recognize that many or most of these cases could have been relatively mild. The finding of higher lifetime PTSD among new soldiers than civilians is consistent with research showing high rates of pre-enlistment trauma exposure among military trainees,[28] while pre-enlistment PTSD may have also contributed to high pre-enlistment GAD due to GAD often developing either in conjunction with (particularly when ignoring DSM's hierarchy exclusion, as we did here) or secondary to PTSD.[29-31] The higher lifetime prevalence of CD among new soldiers than civilians could reflect selection bias into military service based on such personality characteristics as sensation-seeking, impulsivity, and physical aggressiveness.[32-35] These differences in prevalence of PTSD, GAD, and CD contributed to a significantly higher proportion of new soldiers than civilians having a history of 3+ multi-morbid mental disorders (11.3% versus 6.5%). The pre-enlistment disorders of new soldiers were also relatively persistent, with recurrences occurring in 32.5-61.3% of years subsequent to onset across disorders. These persistence results are generally consistent with the small amount of previous research that has been carried out on between-disorder differences in persistence.[36,37]

Lifetime prevalence and persistence were not strongly related to the socio-demographic characteristics of new soldiers, although the signs of these modest associations were generally consistent with those found in previous studies. For instance, women had higher rates of internalizing disorders than men,[5,38] while Hispanics and Non-Hispanic Blacks had lower rates of most disorders than Non-Hispanic Whites.[39-42] The lower rates of pre-enlistment disorders among immigrants are consistent with the "healthy immigrant" effect found in general population studies.[43-45]

We noted in the introduction that an earlier Army STARRS report of active duty soldiers excluding those in BCT found 30-day prevalence of having at least one common DSM-IV disorder to be considerably higher among soldiers (25.1%) than a calibrated sample of civilians (11.6%) and that the absolute prevalence of 30-day disorders with retrospectively-reported pre-enlistment onsets was significantly higher among soldiers (19.2%) than civilians (10.6%). We also noted that this difference between soldiers and civilians could be due either to higher prevalence of pre-enlistment disorders or higher persistence of pre-enlistment mental disorders in the years after enlistment among soldiers than civilians. The possibility of higher pre-enlistment prevalence is of special importance because it raises the question whether early interventions should be carried out with new soldiers.

How should we make sense of the earlier Army STARRS finding that the proportion of soldiers with 30-day disorders and pre-enlistment first onsets is higher than in a calibrated civilian sample in light of the finding reported here from the NSS of less consistent differences in lifetime prevalence between new soldiers and civilians? Differential selection *out* of the Army (i.e., soldiers with pre-enlistment mental disorders being more likely than other soldiers to remain in service beyond a first tour of duty) is one possibility, but this would seem unlikely given evidence that soldiers who have been treated for mental disorders while in service are *less* likely than other soldiers to remain in service.[46,47] Recall bias in dating age of disorder onset also seems unlikely given the tendency for such dating errors towards telescoping.[15] A more plausible possibility, in our view, is that early-onset mental disorders became more chronic in the context of the higher pre-enlistment prevalence of

some anxiety disorders and CD among soldiers than civilians in conjunction with exposure to the special stresses experienced by Army personnel. This possibility is indirectly consistent with evidence that childhood adversities, which are strongly related to early-onset mental disorders, interact with later traumatic experiences to increase risk and severity of adult mental disorders[48-50] as well as with the finding in the earlier Army STARRS report that 30-day mental disorders with pre-enlistment onsets were more severely impairing than those that only started after enlistment.[5]

If pre-enlistment disorders do, in fact, have higher persistence among soldiers than civilians, then targeted post-enlistment interventions might make sense with soldiers having a history of persistent pre-enlistment mental disorders. Although these would presumably be clinical interventions, they could also have a secondary prevention focus given that pre-enlistment disorders are powerful risk factors for serious emotional problems during later years of service. Screening to exclude applicants from service based on common pre-enlistment mental disorders, in comparison, would seem less feasible given the high prevalence and wide socio-demographic distribution of such disorders.

The above results need to be interpreted in the context of three important limitations. First, although the NSS included an assessment of several childhood adversities known to play a role in developing mental disorders (e.g., poverty, abuse, neglect),[48-51] these data are not yet available and thus we could not examine the associations of childhood adversities with lifetime mental disorders. We plan to examine these associations in a future report, including the possibility that childhood adversities moderate the relationships between Army-specific stressors (e.g., BCT, deployment, promotions/demotions) and mental disorder onset and persistence. Second, assessments of mental disorders in the NSS and NCS-R were not identical, although both assessments were validated and shown to yield prevalence estimates consistent with those based on blinded clinical interviews.[24,52] Third, the calibration methods used to make the weighted NCS-R sample equivalent to the NSS were necessarily incomplete given that we have an incomplete understanding of selection factors into Army service. The only practical way to address these latter limitations would be to assess a very large and representative general population survey of late adolescents for mental disorders and follow this sample over a period of several years to study the associations of baseline mental disorders with subsequent Army enlistment. We are unaware of any existing dataset that contains this information. In the absence of such data, the results presented here represent the best available evidence on differences between new soldiers and comparable civilians in prevalence of pre-enlistment lifetime mental disorders, although subsequent follow-ups of the Army STARRS sample will provide data that could make a significant advance over the current findings.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Distributions of socio-demographic and Army career variables in quarter 2 2011 through quarter 4 2012 of the Army STARRS New Soldier Study analysis sample and the target population of all comparable new U.S. Army soldiers[1]

	Regular Army					Guard/Reserve				
	Unweighted		Weighted		Population	Unweighted		Weighted		Population
	%	SE	%	SE	%	%	SE	%	SE	%
Gender[2]										
Male	86.4	0.4	86.2	0.5	86.3	78.6	0.6	78.2	0.7	78.5
Female	13.6	0.4	13.8	0.5	13.7	21.4	0.6	21.8	0.7	21.5
Race/ethnicity[2]										
Non-Hispanic Black	17.5	0.4	17.7	0.4	20.3	16.4	0.3	16.0	0.4	17.9
Non-Hispanic White	61.2	0.4	58.0	0.5	61.3	60.4	0.5	61.0	0.6	64.3
Hispanic	14.4	0.3	16.4	0.3	12.9	15.9	0.3	15.0	0.4	11.9
Other	6.9	0.2	7.9	0.2	5.5	7.3	0.2	8.1	0.3	5.8
Soldier education[2]										
Less than high school	4.3	0.1	4.3	0.1	4.4	20.7	0.4	28.8	0.7	29.2
Completed high school	87.1	0.4	87.6	0.4	87.6	70.9	0.5	63.5	0.7	63.1
Some college/college graduate	8.6	0.3	8.1	0.4	8.0	8.3	0.4	7.7	0.4	7.7
Marital status[2]										
Currently married	13.8	0.3	15.3	0.4	15.1	9.7	0.3	8.9	0.4	8.4
Never married	86.2	0.3	84.7	0.4	84.1	90.2	0.3	90.9	0.4	90.4
Previously married	0.0	0.0	0.0	0.0	0.9	0.2	0.0	0.1	0.0	1.2
Religion[3]										
Protestant	55.7	0.4	54.8	0.5	56.5	57.2	0.4	57.1	0.5	50.3
Catholic	16.9	0.3	17.2	0.3	14.9	19.2	0.3	19.2	0.4	11.9
Other religion	3.9	0.1	4.3	0.2	1.7	4.2	0.1	4.2	0.2	1.3
No religion	23.5	0.3	23.8	0.4	26.8	19.5	0.3	19.5	0.4	36.5
Nativity[4]										
Immigrant	6.7	0.2	7.4	0.3	--	7.2	0.2	6.9	0.2	--
First generation	12.1	0.2	13.2	0.3	--	12.4	0.3	12.3	0.3	--

	Regular Army					Guard/Reserve					
	Unweighted		Weighted		Population		Unweighted		Weighted		Population
	%	SE	%	SE	%		%	SE	%	SE	%
Second+ generation	81.2	0.4	79.5	0.4	--		80.4	0.4	80.8	0.4	--
Parent education relative to Soldier education[4]											
Parents college graduate	27.0	0.4	26.5	0.4	--		27.8	0.4	28.1	0.4	--
Parents some college completed	23.4	0.3	23.6	0.3	--		24.0	0.4	23.9	0.4	--
All other	49.6	0.4	49.9	0.4	--		48.2	0.5	48.0	0.5	--
Age-at-enlistment[2]											
17-18	22.6	0.7	24.3	0.8	23.5		28.3	0.6	33.2	0.9	33.5
19	21.1	0.4	21.1	0.4	21.3		20.3	0.4	19.6	0.4	18.8
20	15.1	0.3	14.6	0.3	14.7		13.6	0.3	12.9	0.3	12.9
21	10.2	0.3	10.0	0.3	10.0		8.9	0.2	8.6	0.3	8.3
22-24	18.3	0.4	17.2	0.4	17.2		14.6	0.3	13.0	0.3	13.5
25+	12.7	0.3	12.9	0.4	13.2		14.3	0.4	12.7	0.5	13.0

Abbreviations: Army STARRS, Army Study to Assess Risk and Resilience in Servicemembers; SE, standard error.

[1] The population data were obtained from the Defense Manpower Data Center Master Personnel and Contingency Tracking System (CTS) for all new soldiers in the Regular Army, Army National Guard, and Army Reserve. Results are based on monthly CTS snapshots for the 20-month period between April 2011 and November 2012. The Army STARRS New Soldier Study analysis included 38,507 participants (Regular Army n=21,840; Guard/Reserve n=16,667), and the target population of comparable new US Army soldiers included 251,068 (Regular Army n=150,337; Guard/Reserve n=100,731). The estimate of population size is averaged over the 20 months to generate the population data.

[2] Gender, race/ethnicity, soldier education, marital status, and age-at-enlistment were used to post-stratify the sample to the population. This allowed the population estimates to be identical to the weighted estimates, except for the small number of cases where self-report data differed from administrative data.

[3] Religion was included in the post-stratification for the Regular Army and Guard soldiers, but was not included in the post-stratification to the population for Reserve soldiers because it was not significant in the final stepwise regression model.

[4] Nativity and parent education were not used for post-stratification because no measures of these variables were available in the total population. Immigrant=the soldier was not born in the US; First generation=the soldier was born in the US but at least one parent was not born in the US; Second+ generation=the soldier and both the soldier's parents were born in the US. Parents college graduate=at least one parent completed college and the soldier had a lower level of education than college graduation; Parents some college=at least one parent completed some college and the soldier had a lower level of education.

Table 2

Estimated lifetime prevalence of DSM-IV internalizing and externalizing disorders in quarter 2 2011 through quarter 4 2012 of the Army STARRS New Soldier Study and separately in a calibrated national civilian comparison sample

| | Total Sample | | | | Regular Army | | | | Guard/Reserve | | | |
| | NSS | | NCS-R | | NSS[1] | | NCS-R[2] | | NSS[1] | | NCS-R[2] | |
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
I. Internalizing disorders												
MDE	7.8	0.2	11.2	4.0	7.2	0.2	11.8	4.7	8.6	0.4	10.5	3.4
BPD	3.6	0.1	6.5	2.9	3.5	0.2	7.0	3.1	3.6	0.2	5.9	2.8
GAD	8.2*	0.2	1.2	0.4	7.5*	0.2	0.5	0.1	9.1*	0.3	2.0	0.8
PD	2.9	0.1	4.0	2.6	2.7	0.1	4.2	2.9	3.3	0.2	3.7	2.2
PTSD	12.6*	0.2	2.5	1.5	12.1*	0.3	2.3	1.6	13.3*	0.3	2.9	1.5
Any internalizing disorder	19.8	0.3	20.3	5.6	18.8	0.3	21.7	6.2	21.0	0.4	18.7	4.9
II. Externalizing disorders												
IED	14.6	0.2	13.5	3.9	14.2	0.3	14.8	4.5	15.1	0.3	11.8	3.4
CD	5.9*	0.2	3.3	1.3	6.2*	0.2	3.0	1.2	5.5*	0.2	3.6	1.5
ODD	10.3	0.2	6.9	3.2	10.3	0.2	7.0	3.4	10.2	0.3	6.8	3.0
SUD	12.6	0.2	13.9	3.6	12.6	0.3	15.0	3.9	12.6	0.3	12.6	3.4
ADHD[3]	6.4	0.2	5.1	2.8	5.9	0.2	5.1	2.8	7.0	0.3	5.2	2.7
Any externalizing disorder	31.8	0.3	28.8	6.1	31.3	0.4	30.8	6.3	32.4	0.4	26.4	6.1
III. Total												
Any of the above disorders	38.7	0.3	36.5	7.3	37.6	0.4	38.5	7.6	40.0	0.5	34.1	7.2
Exactly 1 lifetime disorder	18.9	0.2	17.1	4.5	18.3	0.3	17.7	4.7	19.6	0.4	16.4	4.2
Exactly 2 lifetime disorders	8.5	0.2	12.8	4.3	8.3	0.2	13.8	4.6	8.8	0.3	11.6	4.1
3+ lifetime disorders	11.3*	0.2	6.5	2.4	11.1	0.3	6.9	2.7	11.6*	0.3	6.0	2.0
(n)	(38,507)		(3,514)		(21,840)		(1,757)		(16,667)		(1,757)	

Abbreviations: DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; Army STARRS, Army Study to Assess Risk and Resilience in Servicemembers; SE, standard error; NSS, New Soldier Study; NCS-R, National Comorbidity Survey-Replication; MDE, major depressive episode; BPD, broad spectrum bipolar disorder; GAD, generalized anxiety disorder; PD, panic disorder; PTSD, post-traumatic stress disorder; IED, intermittent explosive disorder; CD, conduct disorder; ODD, oppositional defiant disorder; SUD, substance use disorder; ADHD, attention deficit hyperactivity disorder.

*
Significant difference between NSS and NCS-R (within the total sample, Regular Army, and Guard/Reserve samples) at the .05 level, two-sided test.

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[1]Six individual disorders were significantly more prevalent in the NSS Guard/Reserve than the NSS Regular Army at the .05 level, two-sided test: MDE, GAD, PD, PTSD, IED, ADHD. Rates of any internalizing disorder, any lifetime disorder, and exactly 1 lifetime disorder were also significantly more prevalent in the NSS Guard/Reserve than the NSS Regular Army. CD was the only disorder that was significantly more prevalent in the NSS Regular Army than the NSS Guard & Reserve.

[2]Prevalence rates in the NCS-R Regular Army and NCS-R Guard/Reserve did not significantly differ from one another at the .05 level, two-sided test.

[3]ADHD symptoms were assessed in the NSS only over the past six months, while they were assessed for childhood in the NCS-R and only respondents who met criteria during childhood were then assessed for the past six months. Thus, imputed ADHD was used to estimate rates in the NCS-R.

Table 3

Number of years of recurrence of DSM-IV internalizing and externalizing disorders in quarter 2 2011 through quarter 4 2012 in the Army STARRS New Soldier Study

	Total				Regular Army				Guard/Reserve				Total
	Mean	SE	Proportion[1]	SE	Mean	SE	Proportion[1]	SE	Mean	SE	Proportion[1]	SE	(n)
I. Internalizing disorders													
MDE	2.0	0.1	49.2	1.2	2.1	0.1	48.5	1.5	2.0	0.1	49.9	1.5	(2,544)
BPD	1.8	0.1	44.7	1.4	1.7	0.1	41.9*	2.0	1.9	0.1	48.3	2.1	(1,225)
GAD	2.1	0.1	52.3	1.0	2.2	0.1	51.4	1.4	2.1	0.1	53.3	1.5	(2,524)
PD	3.0	0.1	61.3	1.4	3.0	0.1	60.7	2.1	3.0	0.1	62.0	1.7	(1,016)
PTSD	1.5	0.0	34.6	0.9	1.5	0.0	34.9	1.3	1.4	0.0	34.3	1.1	(4,171)
II. Externalizing disorders[2]													
IED	3.5	0.0	57.7	0.6	3.6*	0.0	57.0	0.8	3.4	0.1	58.4	0.8	(5,387)
CD	3.6	0.1	43.4	1.1	3.7	0.1	43.7	1.3	3.5	0.1	42.9	1.9	(1,907)
ODD	4.4	0.1	51.8	0.8	4.5	0.1	51.6	1.0	4.4	0.1	52.2	1.2	(3,663)
SUD	1.2	0.0	32.5	0.7	1.3	0.0	33.2	1.0	1.2	0.1	31.6	1.2	(3,796)

Abbreviations: DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; Army STARRS, Army Study to Assess Risk and Resilience in Servicemembers; SE, standard error; MDE, major depressive episode; BPD, broad spectrum bipolar disorder; GAD, generalized anxiety disorder; PD, panic disorder; PTSD, post-traumatic stress disorder; IED, intermittent explosive disorder; CD, conduct disorder; ODD, oppositional defiant disorder; SUD, substance use disorder; ADHD, attention deficit hyperactivity disorder.

*
Significant difference between the NSS Regular Army and NSS Guard/Reserve at the .05 level, two-sided test. Only one disorder differed significantly in mean persistence (IED) and another in proportional persistence (BPD) across samples.

[1]
Proportion of years with recurrence is the ratio of number of years in episode beyond the year of onset to total number of years since onset.

[2]
Persistence of attention-deficit/hyperactivity disorder is not assessed by the CIDI screening scales and is thus excluded from this table

Table 4

Socio-demographic predictors of lifetime disorders in quarter 2 2011 through quarter 4 2012 of the Army STARRS New Soldier Study (n = 38,507)[1]

	Any Internalizing		Any Externalizing		Any Disorder	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Sex						
Women	1.7*	(1.6-1.9)	0.9*	(0.9-1.0)	1.2*	(1.2-1.3)
Men	--	--	--	--	--	--
χ^2_1	184.1*		5.0*		38.6*	
φ_c	0.03		0.00		0.01	
Race/ethnicity						
Non-Hispanic Black	0.6*	(0.5-0.6)	0.8*	(0.8-0.9)	0.7*	(0.7-0.8)
Non-Hispanic White	--	--	--	--	--	--
Hispanic	0.7*	(0.6-0.8)	0.9*	(0.8-1.0)	0.8*	(0.8-0.9)
Other	0.9	(0.8-1.1)	1.0	(1.0-1.1)	1.0	(0.9-1.1)
χ^2_3	162.8*		46.7*		138.0*	
φ_c	0.03		0.02		0.02	
Soldier education						
Some college/college graduate	0.8*	(0.7-0.9)	0.8*	(0.8-0.9)	0.8*	(0.7-0.9)
Completed high school	--	--	--	--	--	--
Less than high school	1.0	(0.9-1.1)	1.0	(1.0-1.1)	1.0	(0.9-1.1)
χ^2_2	10.3*		16.0*		16.4*	
φ_c	0.01		0.01		0.01	
Marital status						
Married	--	--	--	--	--	--
Previously/never married	0.9	(0.8-1.1)	1.1*	(1.0-1.2)	1.0	(0.9-1.1)
χ^2_1	1.0		5.6*		0.6	
φ_c	0.00		0.00		0.00	
Religion						
Protestant	--	--	--	--	--	--

	Any Internalizing		Any Externalizing		Any Disorder	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Catholic	0.9	(0.8-1.0)	1.0	(0.9-1.0)	0.9	(0.9-1.0)
Other religion	1.3*	(1.1-1.4)	1.1	(1.0-1.3)	1.2*	(1.1-1.3)
No religion	1.0	(0.9-1.1)	1.0	(1.0-1.1)	1.0	(1.0-1.1)
χ^2_3	15.6*		8.3*		15.3*	
φ_c	0.01		0.01		0.01	
Nativity						
Immigrant	0.8*	(0.7-0.9)	0.8*	(0.7-0.9)	0.8*	(0.7-0.9)
First generation	1.0	(0.9-1.1)	1.0	(0.9-1.1)	1.0	(0.9-1.1)
Second+ generation	--	--	--	--	--	--
χ^2_2	9.1*		21.2*		20.0*	
φ_c	0.01		0.01		0.01	
Parent education relative to Soldier education						
Parents college graduate[2]	1.0	(0.9-1.0)	1.0	(0.9-1.0)	1.0	(0.9-1.0)
Parents some college completed[2]	0.9*	(0.8-0.9)	0.9*	(0.8-0.9)	0.9*	(0.8-0.9)
All other	--	--	--	--	--	--
χ^2_2	12.0*		14.3*		18.1*	
φ_c	0.01		0.01		0.01	
Age[3]						
Standardized age	0.8*	(0.8-0.8)	0.9*	(0.8-0.9)	0.8*	(0.8-0.9)
χ^2_1	73.8*		78.9*		100.2*	
φ_c	0.02		0.02		0.02	

Abbreviations: DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; Army STARRS, Army Study to Assess Risk and Resilience in Servicemembers; OR, odds-ratio; CI, confidence interval.

*
Significantly different from the reference group (indicated by --) at the .05 level, two-sided test.

[1] Based on a series of multivariate logistic regression equations controlling for version of the New Soldier Study, site of Basic Combat Training, service component, and all socio-demographic predictors listed here.

[2] Parents college graduate=at least one parent completed college and the soldier had a lower level of education than college graduation; Parents some college=at least one parent completed some college and the soldier had a lower level of education.

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[3]The mean age of new soldiers was 20.8 years.

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Table 5

Socio-demographic predictors of persistence of lifetime disorders in quarter 2 2011 through quarter 4 2012 of the Army STARRS New Soldier Study[1]

	Any Internalizing		Any Externalizing		Any Disorder	
	IRR	(95% CI)	IRR	(95% CI)	IRR	(95% CI)
Sex						
Women	1.2*	(1.1-1.3)	1.1*	(1.0-1.2)	1.1*	(1.1-1.2)
Men	--	--	--	--	--	--
χ^2_1	11.1*		5.3*		17.8*	
φ_c	0.03		0.02		0.03	
Race/ethnicity						
Non-Hispanic Black	1.0	(0.9-1.1)	0.9*	(0.8-0.9)	0.9*	(0.8-1.0)
Non-Hispanic White	--	--	--	--	--	--
Hispanic	1.0	(0.9-1.1)	0.9*	(0.8-1.0)	0.9*	(0.8-1.0)
Other	1.0	(0.8-1.1)	0.7*	(0.6-0.8)	0.8*	(0.8-0.9)
χ^2_3	0.5		45.0*		25.1*	
φ_c	0.01		0.06		0.03	
Soldier education						
Some college/college graduate	0.9	(0.7-1.1)	0.9	(0.8-1.1)	0.9	(0.8-1.1)
Completed high school	--	--	--	--	--	--
Less than high school	1.0	(0.9-1.1)	1.0	(0.9-1.1)	1.0	(0.9-1.1)
χ^2_2	1.2		0.9		0.9	
φ_c	0.01		0.01		0.01	
Marital status						
Married	--	--	--	--	--	--
Previously/never married	1.0	(0.9-1.2)	1.0	(0.9-1.1)	1.0	(0.9-1.1)
χ^2_1	0.1		0.1		0.2	
φ_c	0.00		0.00		0.00	
Religion						
Protestant	--	--	--	--	--	--

	Any Internalizing		Any Externalizing		Any Disorder	
	IRR	(95% CI)	IRR	(95% CI)	IRR	(95% CI)
Catholic	1.0	(0.9-1.1)	1.0	(0.9-1.1)	1.0	(0.9-1.1)
Other religion	1.1	(0.9-1.3)	1.0	(0.9-1.2)	1.1	(1.0-1.2)
No religion	1.1	(1.0-1.2)	1.0	(1.0-1.1)	1.0	(1.0-1.1)
χ^2_3	2.6		0.9		4.0	
φ_c	0.02		0.01		0.01	
Nativity						
Immigrant	0.7*	(0.6-0.8)	0.8*	(0.7-1.0)	0.8*	(0.7-0.9)
First generation	0.9	(0.8-1.0)	0.8*	(0.7-0.9)	0.8*	(0.8-0.9)
Second generation	--		--		--	
χ^2_2	16.4*		21.4*		33.4*	
φ_c	0.04		0.04		0.04	
Parent education relative to Soldier education						
Parents college graduate[2]	0.9*	(0.8-1.0)	1.1*	(1.0-1.2)	1.0	(0.9-1.0)
Parents some college completed[2]	0.9	(0.8-1.0)	1.0	(1.0-1.1)	1.0	(0.9-1.0)
All other	--		--		--	
χ^2_2	10.2*		8.5*		0.2	
φ_c	0.03		0.02		0.00	
Age						
Age of onset	0.9*	(0.9-0.9)	0.9*	(0.9-0.9)	0.9*	(0.9-0.9)
χ^2_1	91.8*		86.7*		154.4*	
φ_c	0.09		0.08		0.08	
Time since onset	0.9*	(0.9-0.9)	0.8*	(0.8-0.9)	0.9*	(0.8-0.9)
χ^2_1	184.7*		623.0*		800.9*	
φ_c	0.13		0.20		0.18	
(n)	(11,480)		(14,753)		(26,233)	

Abbreviations: Army STARRS, Army Study to Assess Risk and Resilience in Servicemembers; IRR, incident rate ratio.

*
Significantly different from the reference group (indicated by --) at the .05 level, two-sided test.

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[1]Based on a series of negative binomial equations controlling for version of the New Soldier Study, site of Basic Combat Training, service component, and all socio-demographic predictors listed here.

[2]Parents college graduate=at least one parent completed college and the soldier had a lower level of education than college graduation; Parents some college=at least one parent completed some college and the soldier had a lower level of education.