



Psychological Problems among 12th-Grade Students Predicting Military Enlistment: Findings from the Monitoring the Future Survey

Carol Chu , Chelsey R. Wilks, Kelly L. Zuromski, Samantha L. Bernecker , Andrew King, Peter M. Gutierrez , Thomas E. Joiner, Matthew K. Nock, Robert J. Ursano, and Ronald C. Kessler 

Objective: Rates of some psychological disorders are higher among enlisted U.S. military personnel than socio-demographically matched civilians. Indirect evidence suggests some internalizing and externalizing psychological problems among enlistees onset prior to enlistment. However, the consistency and strength of the associations between pre-enlistment psychological problems and enlistment over time is unknown. We address this uncertainty by examining whether internalizing and externalizing problems in high school predicted subsequent military enlistment using a large cohort-sequential panel study.

Method: The Monitoring the Future study administered baseline surveys from 1989–2014 and biennial follow-up surveys two and four years later to national samples of high-school seniors (N = 20,823). Validated self-report scales assessed internalizing (depression, low self-esteem) and externalizing (risk-taking, school misbehavior, conduct disorder, interpersonal violence, alcohol, and drug use) problems in each survey. Follow-up surveys assessed military enlistment. Logistic

Carol Chu is postdoctoral research fellow at Harvard University and an assistant psychologist at McLean Hospital. *Chelsey R. Wilks* is an Army STARRS/MSRC postdoctoral fellow at Harvard University. *Kelly L. Zuromski* is an Army STARRS/MSRC postdoctoral fellow at Harvard University. *Samantha L. Bernecker* is a former Army STARRS/MSRC postdoctoral fellow at Harvard University and is currently employed by the Boston Consulting Group. *Andrew King* is an analyst at the Department of Health Care Policy at Harvard Medical School. *Peter M. Gutierrez* is a Professor of Psychiatry at the University of Colorado School of Medicine and a licensed Clinical Psychologist at the VA VISN 19 MIRECC. Dr. Gutierrez's clinical training was in child and adolescent psychology, with an emphasis on serious psychopathology and suicide. *Thomas E. Joiner* is the Robert O. Lawton Distinguished Professor of Psychology and Director of the Psychology Clinic at Florida State University. His research focuses primarily on the study of the nature, causes, and management of suicidal behavior and related disorders (e.g., eating disorders, mood disorders, personality disorders). *Matthew K. Nock* is the Edgar Pierce Professor of Psychology; Harvard College Professor; Chair, Department of Psychology, Harvard University; Research Scientist, Massachusetts General Hospital; and Research Scientist, Boston Children's Hospital. The primary goal of his research is to understand why people engage in behaviors that are harmful to themselves and to translate the knowledge gained into better methods for assessing and treating harmful behaviors. *Robert J. Ursano* is Professor of Psychiatry and Neuroscience and Chairman of the Department of Psychiatry at the Uniformed Services University of the Health Sciences, Bethesda, Maryland. He is the founding Director of the internationally recognized Center for the Study of Traumatic Stress. *Ronald C. Kessler* is the McNeil Family Professor of Health Care Policy at Harvard Medical School. His research deals broadly with the social determinants of mental health and illness as studied from an epidemiological perspective.

Address correspondence to Ronald C. Kessler, Department of Health Care Policy, Harvard Medical School, Boston, MA 02115-5899 E-mail: kessler@hcp.med.harvard.edu

regression models were used to estimate associations of problems scales with subsequent enlistment.

Results: School misbehavior in 12th grade, and risk-taking in 12th grade and two years after graduation were associated with significantly elevated odds of enlistment at follow-up. Although modest, these associations were linear and invariant across respondent sex and baseline survey year.

Conclusions: School misbehavior and risk-taking predicted subsequent enlistment and there was no evidence of historical changes in these associations over the course of 25 years; these pre-enlistment psychological problems do not fully explain the high rates of psychological disorders among enlisted military personnel. Further research is needed to determine whether these predictors are associated with negative outcomes during or after military service.

In the U.S. military, psychological disorders are the leading cause of impairment and morbidity (Armed Forces Health Surveillance Center, AFHSC, 2019). Some studies have found that several psychological disorders are more common among enlisted U.S. military personnel than socio-demographically matched civilians (Hoerster et al., 2012; Kessler et al., 2014). It is not known how much this is due to people with psychological disorders being drawn to military service versus the effects of military service on these disorders. A survey of new U.S. Army soldiers carried out in the Army Study to Assess Risk and Resilience in Servicemembers (STARRS; Ursano et al., 2014) argued that selection is involved to some degree based on the finding that lifetime prevalence of certain DSM-IV disorders was significantly higher among new soldiers than socio-demographically matched civilians from a separate survey (Rosellini et al., 2015). The disorders with elevated prevalence among new soldiers included two internalizing disorders (generalized anxiety disorder, posttraumatic stress disorder) out of five assessed (the others were major depressive disorder, bipolar disorder, and panic disorder) and one externalizing disorder (conduct disorder) out of five assessed (the others were attention-deficit/hyperactivity disorder, intermittent explosive disorder, oppositional-defiant disorder, and substance use disorder). However, questions have been raised about whether the

comparison group was representative of all civilians and whether the assessments of psychological disorders in the Army STARRS survey and comparison survey were identical (Hoge et al., 2014).

The optimal way to evaluate the possibility of selection into military service would be to assess psychological disorders in a large representative sample of late adolescents who were followed over time to determine if these disorders predicted subsequent enlistment. We are aware of three studies that did this. Johnson and Kaplan (1991) followed 2,408 7th-grade males in Houston into early adulthood and found that 7th grade externalizing problems (e.g., arrests, disliked by peers) and lack of social integration (e.g., family moved around during adolescence, changes in social network) predicted subsequent military enlistment (odds-ratios [ORs] = 1.55 to 4.44) but that internalizing problems, including low self-confidence and self-derogation, did not. Elder et al. (2010) followed 6,938 adolescent males from the National Longitudinal Study of Adolescent Health into early adulthood and found that history of fighting and lack of social connectedness during adolescence predicted subsequent enlistment (OR = 1.16). Internalizing problems were not examined. Teachman and Tedrow (2014) followed 4,599 male and 4,385 female adolescents in the 1998–2009 National Longitudinal Survey of Youth into early adulthood and found that

intermediate levels of delinquent behavior (e.g., destroying and damaging property, attacking others, arrests) were associated with significantly elevated odds of enlistment compared to students with either very low or very high levels of delinquency. No other externalizing or internalizing problems were examined.

Despite some evidence that rates of some internalizing and externalizing psychological disorders are higher among enlisted U.S. military personnel (Hoerster et al., 2012; Kessler et al., 2014) and that these psychological problems may have onset prior to enlistment (Rosellini et al., 2015), there is no direct evidence for the association between pre-enlistment psychological problems and enlistment, and the strength of these associations over time is unknown. The purpose of this study was to examine internalizing and externalizing symptoms as predictors of military enlistment in the four years after high-school graduation. We carried out a secondary analysis similar to these earlier studies in a larger sample with more diverse measures of psychological problems. The dataset we used was the Monitoring the Future (MTF) study, a national cohort-sequential panel survey of high school seniors that has measured trends in adolescent substance use and related attitudes in annual surveys since 1976 and followed these students biennially for 12 years after high school graduation (Miech et al., 2019). Beginning in 1989, MTF added survey questions about other topics that are rotated across subsamples to reduce respondent burden. We studied the 20,823 MTF respondents in the 1989–2014 baseline subsamples who were administered questions about psychological problems. Given that the possibility of differential selection into military service across historical time has been the subject of speculation (Segal et al., 1999), we investigated whether associations of psychological problems with subsequent military enlistment changed over the span of nearly three decades. Study findings may have implications for understanding

the high rates of some psychological disorders among enlisted military personnel.

METHODS

Sample and Data Collection

The baseline MTF survey is carried out each spring via group self-administration in classrooms selected to be representative of all secondary students in the country. Flyers are provided to students and letters to parents to explain the study. Passive parental informed consent and active adolescent assent are required for participation. Subsequent biennial mail follow-up surveys track random subsamples of baseline respondents. Periodic newsletters are mailed to respondents between baseline and follow-ups to report study results, maintain rapport, and request address updates. Follow-up paper and pencil surveys are sent by mail for self-administration accompanied by a 25 USD check and a pre-stamped/addressed return envelope. Respondents who do not complete the follow-up survey receive a reminder letter, postcard, and phone call from MTF staff.

The 115 core MTF questions focus largely on substance use. The expanded 1,185 MTF questions beginning in 1989 are rotated across six random subgroups of respondents to expand breadth of assessment without substantially increasing respondent burden. We focus on MTF forms 2 and 6, which contain the largest number of questions about psychological problems. These baseline surveys were completed by 20,823 12th-grade students (48.9% male; $n = 10,174$) between 1989 and 2014 with response rates of 79.2–86.2% (82.8% mean) over those years (Miech et al., 2016). Biennial follow-up surveys repeated the psychological problem questions and included information about subsequent educational and career experiences through 12 years after baseline. We

consider military enlistment reported only in the first two follow-up surveys (T1-T2) because the majority of reported enlistments (66.0% male; 63.1% female) were in those surveys (see Supplemental Table S1). Conditional response rates were 39.8–73.1% (58.7% mean) at T1 and 20.1–69.0% (53.9% mean) at T2. See Miech et al. (2016) for additional details regarding MTF study design.

Measures

Nine types of psychological problems are included in the surveys. Two involve internalizing problems (depression symptoms, self-esteem) and seven externalizing problems (risk-taking, school misbehavior, overt and covert conduct disorder, interpersonal violence, alcohol and illicit substance use). The same questions are asked in the T1-T2 surveys with the exception of school misbehavior, which is assessed only at T0 and replaced in the follow-up surveys with questions about vocational experiences that include a question about military enlistment. All of the nine psychological problems are assessed in multi-item scales that were originally developed and psychometrically validated by the MTF researchers (Laetz & Kloska, 2015). We confirmed all nine scales in exploratory factor analyses; see Supplemental Table S2 for a list of all scales and items for each scale.

Internalizing Problems

Depression symptoms, such as hopelessness and anhedonia, is assessed only in form 6. The assessment consists of four balanced (i.e., two stated positively and two negatively) items adapted from the Center for Epidemiologic Studies Depression Scale (Radloff, 1977). There is no explicit recall period. Response options range from 1 (disagree) to 5 (agree). Responses were summed (after reverse-coding positive items) without weighting

to create the scale. T0-T1 reliabilities are $\alpha = .80-.82$. *Low self-esteem* is assessed with eight balanced items created by the MTF researchers based on earlier research (e.g., worthlessness, positive attitudes toward oneself, satisfaction with oneself; Ryff & Keyes, 1995) using the same 1–5 disagree-agree response options (Schulenberg et al., 2005) and summed without weighting. T0-T1 reliabilities are $\alpha = .88-.89$.

Externalizing Problems

School misbehavior is assessed with a 4-item scale over a 4-week recall period based on earlier research (Bryant et al., 2003); this scale assessed truancy, skipping class, being sent to detention, and school suspensions/expulsions. Reliability is $\alpha = .60$. *Risk-taking* (Jessor et al., 1994), such as engagement in potentially dangerous and risky behaviors, is assessed with a 2-item question series. T0-T1 reliabilities are $\alpha = .80-.80$. Both scales use the same 1–5 disagree-agree response options as the internalizing scales.

The other 5 externalizing scales are assessed with questions about frequency of behaviors over a 12-month recall period. *Overt and covert conduct disorder* scales include items based on the DSM-III-R (American Psychiatric Association, 1987) with 5-point ordinal response options from 1 (not at all) to 5 (5 or more times). There are 5 items in the *overt conduct disorder* scale (T0-T1 reliabilities of $\alpha = .76-.72$), which included hitting others, using a weapon to get something, stealing cars, and arson, and four in the *covert conduct disorder* scale (T0-T1 reliabilities of $\alpha = .74-.72$), which included breaking and entering, and stealing. The same response categories are used in the *interpersonal violence scale*, which includes 3 items based on the adolescent problem behavior literature (Jessor et al., 1994), such as getting into fights at work/school, gang fights, and hurting

someone else such that they require medical attention. T0-T1 reliabilities are $\alpha = .73-.65$.

Past-year *alcohol use* and past-year *illicit substance use* are assessed with single questions: “*On how many occasions (if any) have you been drunk or very high from drinking alcoholic beverages during the last 12 months?*” (only asked in form 6) and “*On how many occasions (if any) have you used/taken [substance] during the last 12 months?*” Nine illicit substances are assessed in separate questions: marijuana/hashish, LSD, other hallucinogens, cocaine, amphetamines, sedatives/barbiturates, tranquilizers, heroin, and narcotics. The response options are from 1 (0 occasions) to 7 (40+ occasions). We kept the 1–7 alcohol scale separate and created a 9–63 illicit substance use scale by summing the 1–7 responses across the nine types of substances.

Transforming Skewed Distributions

We transformed skewed distributions of the problem scales (see Supplemental Table S3) by assigning each respondent a decile on the distribution of each scale (0–9) and then standardizing this transformed score to a mean of 0 and standard deviation of 1. The exceptions were interpersonal violence and covert conduct disorder, both of which were so highly skewed that they were transformed into 0–1 dichotomies, where 1 = any positive response. The proportions positive on these two at T0-T1 were 26.9–16.4% for interpersonal violence and 10.7–4.8% for covert conduct disorder.

Socio-demographics

Several baseline socio-demographics have been found previously to predict military enlistment in MTF (Bachman et al., 2000; Segal et al., 1999; Segal et al., 1998) and were included as covariates in our study: sex, race/ethnicity (non-Hispanic

White, non-Hispanic Black, Hispanic, Other), census division (New England, Mid-Atlantic, East/North Central, West/North Central, South Atlantic), urbanicity (large metropolitan, other metropolitan, non-metropolitan), parent education (college, some college, high school, less than high school), school type (public school, private school), birth order (only child, oldest, middle, youngest), political preference (liberal, conservative, independent), and religion (Catholic, other Christian, other religion, none). The T1 survey additionally assessed: respondent’s marital status (currently, previously, never married), number of children (0, 1+), and education (high school, some college).

Military Enlistment

T1-T2 respondents were asked “*How likely are you to serve on active duty in the armed forces?*” Responses options were: 1 = Definitely Won’t, 2 = Probably Won’t, 3 = Probably Will, 4 = Definitely Will, 5 = I am doing this now, 6 = I have done this. We recoded these responses into a dichotomous 1–0 Yes-No measure of enlistment-to-date where original scores of 5–6 were recoded to Yes and original scores of 1–4 were recoded to No.

Analysis Methods

The small amount of item-level missing data in the T0 completed surveys (0.6–7.5% across scales; see Supplemental Table S4) was imputed separately for boys and girls using multiple imputation (MI; 5 imputations) by predictive mean matching (Little, 1988). The same procedure was used to impute missing scores on the depression symptom and alcohol scales for respondents in the form 2 subsample. T0 scales were then constructed based on these imputations in each MI dataset. Item-level missing values in the T1 survey (0.7–3.3% missing across scales; see Supplemental

Table S4) were then imputed among respondents who completed the T1 survey using the T0 scales and socio-demographics along with valid T1 items. T1 scales were then constructed in each of the five MI datasets for those who completed the T1 survey and T1 scale scores were imputed for those who did not complete the T1 survey using T0 scales and socio-demographics.

MI logistic regression analysis was used to estimate bivariate associations of each T0 psychological problem scale (i.e., depression symptoms, low self-esteem, risk-taking, school misbehavior, overt conduct disorder, covert conduct disorder, interpersonal violence, alcohol use; and illicit substance use) with T1 military enlistment controlling for socio-demographics. Parallel models were then estimated for T1 psychological problems and T0 school misbehavior predicting enlistment between T1 and T2 among respondents who had not enlisted as of T1. We also examined nonlinearities by including a high-risk indicator at the 80th percentile of each problem scale. Multivariate models were estimated with all significant predictors. Finally, we investigated whether associations of psychological problems with enlistment differed by respondent sex and changed across five time periods when military enlistment rates are known to have changed (Defense Manpower Data Center, 2012): the first Gulf War (-1989–1991); the Clinton presidency (1992–1998); the Balkans Conflict and September 11 Terrorist Attacks (1999–2003); the start of the Iraq and Afghanistan wars (2004–2008); and the Obama presidency and War on Terror (2009–2014). Logistic regression coefficients and ± 2 times their MI standard errors were exponentiated to generate ORs and 95% confidence intervals (CIs). In addition to socio-demographic characteristics, the four dummy variables for time were included as covariates in all models. Given the large number of models tested, the Benjamini-Hochberg method (Benjamini & Hochberg,

1995) was used to adjust significance tests for the false discovery rate.

RESULTS

Enlistment

Military enlistment by T1 averaged 3.4% (5.3% boys; 1.7% girls) over the study period, but decreased significantly over time ($F_4 = 5.4, p < .001$) (Table 1). The conditional T2 enlistment rate averaged 1.7% (3.1% boys; 0.5% girls) and again varied significantly over the study period ($F_4 = 2.4, p = .045$), for a cumulative enlistment rate as of 4 years after high school of 5.0%. The average enlistment rate by T2 in the MTF survey was about 65% of the enlistment rate among respondents over all follow-up waves, for a total MTF enlistment rate of about 7.7% (5.0%/.65). The latter is slightly higher than the published population-level enlistment rate of 6.6% among all U.S. students who graduated from high school between 1989 and 2014 (National Center for Education Statistics 2019).

Socio-demographics Predicting Enlistment

On average, 0.3% of respondents did not graduate from high school or complete the GED equivalent by T1. Consistent with prior MTF reports (Bachman et al., 2000; Segal et al., 1998; Segal et al., 1999), enlistment by T1 was significantly associated with being male (OR [95% CI] = 3.15 [2.58–3.86], $p < .05$), Non-Hispanic Black (1.81 [1.31–2.50], $p < .05$), living in a Non-Metropolitan Area (1.45 [1.11–1.88], $p < .05$), having parents with high-school level education compared to parents with college-level education (1.39 [1.03–1.87], $p < .05$), attending public rather than private school (2.33 [1.55–3.51], $p < .05$), and identifying as Protestant Christian rather

TABLE 1. Military Enlistment Reported in the MTF Sample between 1990 and 2015^a

		T ₁ Enlistment			T ₂ Enlistment ^b			Population Enlistment Rate
		%	(SE)	(n)	%	(SE)	(n)	%
Baseline Survey Years								
First Gulf War	1989–1991	5.1	(0.5)	(2,466)	2.2	(0.3)	(2,257)	9.3
Clinton Presidency	1992–1998	3.6	(0.2)	(5,741)	1.7	(0.2)	(5,349)	7.5
Balkan Conflict and 9/11	1999–2003	3.3	(0.3)	(4,081)	1.9	(0.2)	(3,825)	6.8
Start of Iraq/Afghanistan Wars	2004–2008	2.9	(0.3)	(4,063)	1.5	(0.2)	(3,803)	5.5
Obama Presidency/War on Terror	2009–2014	2.8	(0.2)	(4,472)	1.2	(0.1)	(2,997)	4.6
Total	1989–2014	3.4	(0.1)	(20,823)	1.7	(0.1)	(18,231)	6.6
F ₄		5.4*	<.001		2.4*	0.045		

Abbreviations. MTF, Monitoring the Future Survey; SE, standard error.

*Significant at the .05 level, two-sided MI-based test.

^aEstimates based on 5 MI weighted datasets. Standard errors are calculated to reflect the effects of the multiple imputations. Sample sizes represent the total numbers of respondents to the T1 surveys and the total number of eligible respondents (i.e., not previously enlisted) in the T2 survey.

^bExcluded from the T2 enlistment sample are baseline respondents who reported any enlistment or were imputed to be enlisted at T1. Respondents from the baseline survey years in 2013–2014 were not asked about T2 follow-up data and had only T1 follow-up data.

than Catholic (1.37 [1.09–1.72] $p < .05$; see Supplemental Table S5 for details). Enlistment between T1 and T2 was significantly associated with being male and having parents with less than high-school level education.

Associations among Problem Scales

Exploratory factor analysis found two meaningful dimensions at both timepoints (T0–T1 eigenvalues of 2.8–2.4, 1.7–1.7, and 1.0–1.1 for the first three unrotated principal factors) and nine psychological problem scales (see Supplemental Table S6). The two scales on the first dimension represent internalizing problems (depression symptoms, low self-esteem; rotated factor loadings .94-.95) and the remaining seven scales represent externalizing problems (school misbehavior, risk-taking, overt and covert conduct disorder, alcohol use, and illicit substance use; rotated factor loadings .38-.70). The factors were correlated $r = .16-.12$ at T0–T1.

Psychological Problems Predicting Enlistment

Neither of the two internalizing problem scales predicted enlistment significantly at either T1 or T2 (Table 2). Three externalizing scales were significant predictors: school misbehavior at T1 (OR [95% CI] = 1.08 [1.01–1.16], $p < .05$) and T2 (1.30 [1.14–1.49], $p < .05$); risk-taking at T1 (1.20 [1.10–1.31], $p < .05$) and T2 (1.23 [1.07–1.41], $p < .05$); and interpersonal violence at T2 (1.56 [1.16–2.11], $p < .05$). Four of these five individually significant associations (the exception was school misbehavior predicting T1 enlistment) remained significant after adjusting for the false discovery rate ($p = .001-.012$). A comparison of the psychological problems predicting enlistment at T1 versus T2 (Table 2) indicated five externalizing psychological problems were more strongly related to enlistment between T1 and T2 than between baseline and T1: risk-taking ($F = 4.4$, $p = .037$), school misbehavior ($F = 13.4$, $p < .001$), covert conduct disorder ($F = 5.1$, $p = .033$), illicit substance use

TABLE 2. Univariate Associations of Internalizing and Externalizing Problem Scales with Subsequent Military Enlistment Pooled across All MTF Cohorts^a

	T ₁ Enlistment			T ₂ Enlistment			Enlistment Differences ^b	
	OR	(95% CI)	<i>P</i> _{F1} ^c	OR	(95% CI)	<i>P</i> _{F1} ^c	F ₁	<i>P</i> _{F1}
Internalizing								
Depression symptoms	1.06	(0.97–1.15)	0.40	1.11	(0.95–1.30)	0.38	0.6	0.46
Low self-esteem	1.02	(0.93–1.11)	0.90	1.08	(0.90–1.29)	0.48	0.3	0.58
Combined ^d	1.03	(0.95–1.12)		1.08	(0.90–1.30)		0.3	0.59
Externalizing								
School misbehavior ^e	1.08*	(1.01–1.16)	0.21	1.30*	(1.14–1.49)	0.001	13.4*	<.001
Risk-taking	1.20*	(1.10–1.31)	0.001	1.23*	(1.07–1.41)	0.012	4.4*	0.037
Overt conduct disorder	1.04	(0.95–1.14)	0.91	0.97	(0.84–1.12)	0.38	0.0	0.86
Covert conduct disorder	1.02	(0.78–1.32)	0.63	1.49	(0.78–2.86)	0.69	5.1*	0.033
Interpersonal violence	1.19	(0.91–1.56)	0.40	1.56*	(1.16–2.11)	0.012	6.6*	0.013
Alcohol use	0.99	(0.91–1.08)	0.90	1.04	(0.91–1.19)	0.61	2.8	0.10
Illicit substance use	0.95	(0.86–1.05)	0.52	1.09	(0.93–1.28)	0.39	7.8*	0.009
Combined ^d	1.07	(1.00–1.16)		1.17	(0.99–1.39)		7.6*	0.009

Abbreviations. MTF, Monitoring the Future Survey; OR, odds ratio; CI, confidence interval.

*Significant at the .05 level, two-sided MI-based test.

^aModel estimates are based on 5 MI weighted datasets. All models controlled for baseline year demographic information (gender, race, census division, urbanicity, parent education, school type, and religion). Excluded from the analysis of T2 enlistment were respondents with any observed or imputed enlistment at T1 or respondents with a baseline year survey in 2013 or 2014. Except for interpersonal violence and covert conduct, internalizing and externalizing problem scale values ranged from 0–9, corresponding to a decile categorization scheme, and were divided by its own standard deviation. Interpersonal violence and conduct disorder decile values were top-coded at 1, creating a dichotomous variable (values = 0,1) indicating any endorsement of an item within each separate scale.

^bSignificance of the interaction of the enlistment period and each externalizing and internalizing problem in a pooled model of T1–T2 time periods.

^c*p*-value adjusted for the false-discovery rate.

^dCombined total score equals the sum of all percentile-transformed externalizing and internalizing problem scale scores within a type of problem scale (internalizing: values = 0–18; and externalizing: values = 0–62).

^eSchool misbehavior was only measured at baseline.

($F = 7.8$, $p = .009$), interpersonal violence ($F = 6.6$, $p = .013$).

Multivariate analysis found that risk-taking (OR [95% CI] = 1.20 [1.10–1.31]) explained the significant association of school misbehavior (1.03 [0.96–1.11]) with T1 enlistment after adjusting for socio-demographic characteristics. Risk-taking and school misbehavior remained significant (risk-taking 1.19 [1.03–1.37]; school misbehavior 1.26 [1.10–1.44]) in the T2 model and explained the significant association of interpersonal violence (1.35 [0.99–1.85]) with T2 enlistment (Table 3). In separate models predicting T1 and T2 enlistment, the two-way interactions between school misbehavior, interpersonal violence, and risk-taking were consistently non-significant

($F_1 = 0.1$ – 2.6 , $p = .75$ – $.11$; see Supplemental Table S7).

Subgroup Associations

We were unable to document significant interactions between problem scores and sex in predicting enlistment ($F_1 = 0.0$ – 2.2 , $p = .15$ – $.93$; see Supplemental Table S8). We also investigated nonlinear associations by including dummy variables for scoring at or above the 80th percentile on each problem score in addition to the linear term. None of these dummy variables was significant in predicting either T0 or T1 enlistment (see Supplemental Table S9). Finally, we examined whether the associations of psychological problems with

TABLE 3. Multivariate Associations of Problem Scales with Subsequent Military Enlistment Pooled across All MTF Cohorts^a

	T1 enlistment		T2 enlistment	
	OR	(95% CI)	OR	(95% CI)
School misbehavior	1.03	(0.96–1.11)	1.26*	(1.10–1.44)
Risk-taking	1.20*	(1.10–1.32)	1.19*	(1.03–1.37)
Interpersonal violence	-	-	1.35	(0.99–1.85)

Abbreviations. MTF, Monitoring the Future Survey; OR, odds ratio; CI, confidence interval.

*Significant at the .05 level, two-sided MI-based test.

^aModel estimates are based on 5 MI weighted datasets. All models controlled for baseline year demographic information (gender, race, census division, urbanicity, parent education, school type, and religion). Excluded from the analysis of T2 enlistment were respondents with any observed or imputed enlistment at T1 or respondents with a baseline year survey in 2013 or 2014. Except for interpersonal violence, problem scale values ranged from 0–9, corresponding to a decile categorization scheme, and were divided by its own standard deviation. Interpersonal violence decile values were top-coded at 1, creating a dichotomous variable (values = 0,1) indicating any endorsement of an item within the scale.

enlistment varied significantly across key time intervals over the study years, but none of these interactions was significant ($F_4 = 0.2\text{--}1.0$, $p = .40\text{--}.95$; see Supplemental Table S10).

DISCUSSION

In this nationally representative sample of 1989–2014 high-school seniors, school misbehavior and risk-taking were significant predictors of military enlistment in the four years after graduation. Interpersonal violence also emerged as a significant predictor in the four years after enlistment; however, it was no longer significant after controlling for school misbehavior and risk-taking. We found no evidence that internalizing problems (depression symptoms, low self-esteem) or other externalizing problems (conduct disorder, alcohol and substance use) predict enlistment. These patterns were

the same for men and women and the consistency of these patterns over time strengthens the case that these associations are stable over historical time.

Our failure to find that depression symptoms and low self-esteem predict enlistment is consistent with the retrospective reports obtained in the STARRS study (Rosellini et al., 2015) and the prospective Johnson and Kaplan (1991) study. This suggests that those who enlist in the military are not reporting more symptoms of depression or low self-esteem; however, we were unable to evaluate the association between other internalizing symptoms and enlistment. For example, generalized anxiety disorder and posttraumatic stress disorder, both of which had significantly elevated lifetime prevalence among new Army soldiers compared to civilians in STARRS, were not assessed either in the MTF study or in any of the three other longitudinal studies reviewed in the introduction. The possibility that these anxiety disorders are associated with increased probability of subsequent enlistment is plausible given that soldiers are known to have high rates of childhood adversity and trauma (Bandoli et al., 2017; Stein et al., 2018), both of which are risk factors for generalized anxiety disorder and posttraumatic stress disorder (Kessler et al., 2018; McLaughlin et al., 2017). Interpersonal violence, which was associated with enlistment at T2 in the MTF data, is also related to a history of traumatic events and risk for PTSD among adolescents (Carliner et al., 2017; Netto et al., 2016).

All three prior longitudinal studies reviewed in the introduction found that externalizing problems predict subsequent military enlistment (Elder et al., 2010; Johnson & Kaplan, 1991; Teachman & Tedrow, 2014). Consistent with these results, the STARRS survey found a significantly higher retrospectively reported lifetime prevalence of conduct disorder among new soldiers than in the comparison civilian study (Rosellini et al., 2015). The MTF results are somewhat different in that the measures of overt and covert conduct disorder did not predict enlistment. However,

school misbehavior and, for enlistment at T2, interpersonal violence, both of which assess behaviors in the spectrum of overt conduct disorder, did predict enlistment. Given that interpersonal violence is a core aspect of overt conduct disorder, it is not clear why interpersonal violence predicted T2 enlistment while conduct disorder did not. This pattern suggests that soldiers enlisting when they are older have more history of interpersonal violence than those who enlist when they are younger (on average, 22 years old at T2 rather than 20 years old at T1). This delay may be related to the fact that interpersonal violence in adolescence is associated with a lower likelihood of employment and lower educational success (Carter, 2019; Frøyland & von Soest, 2020). Limited occupational opportunities might make military service more attractive, particularly given that the military offers competitive compensation and benefits. Time spent seeking employment and/or completing the application requirements (e.g., passing the Armed Services Vocational Aptitude Battery test) for military service may delay military enlistment. We were unable to examine this possibility in the MTF study because the T1 survey did not assess difficulties in obtaining or maintaining employment.

Our failure to find interactions between risk-taking and the other MTF externalizing problems suggests that the risk-taking predispositions that predict military enlistment are not part of a broader externalizing problem cluster. This is important because responses to the two items in the MTF risk-taking scale (*I get a real kick out of doing things that are a little dangerous; I like to test myself every now and then by doing something a little risky*) cannot be taken unequivocally as indications of problem behaviors. Predispositions to risk-taking are known to be multidimensional, with some people being more prone to risk-taking in one domain (e.g., making investments) than others (e.g., health behaviors; Highhouse et al., 2016). Some types of risk-taking predispositions are associated with positive outcomes. For example, investment

risk-taking on the part of top managers has a positive association with firm financial performance across a range of competitive environments (Gilley et al., 2002) and physical risk-taking is associated with physical bravery (Kugel et al., 2018). On the other hand, ethical risk-taking is associated with dishonest behaviors (Zimmerman et al., 2014). Based on this complexity, it is unclear whether the association between responses to the two statements in the brief MTF risk-taking scale and subsequent enlistment should be seen in a positive or negative light.

Several study limitations are noteworthy. First, the psychological problem dimensions assessed in MTF were limited. Importantly, generalized anxiety disorder and posttraumatic stress disorder, which were both elevated among new soldiers in the retrospective Army STARRS analysis, were not included in the MTF study. Second, some of the dimensions included in MTF were measured with very short scales or single items. Third, we were unable to examine whether predictors of enlistment varied across service branches, rank, years of service, and self-reported motivations for enlistment due to the absence of data on branch of service in the MTF follow-up surveys. Relatedly, we were unable to account for income to determine whether socioeconomic status may have influenced enlistment. Fourth, we were unable to investigate the mechanisms underlying the association of risk-taking with military enlistment because of the sparseness of the MTF measures. Fifth, we were unable to follow respondents beyond enlistment into service and determine if the psychological problems that predict enlistment are consequential for military service. Given the fairly modest effect sizes observed, it is unclear whether these associations would lead to negative outcomes during or after military service.

One vehicle for addressing the above limitations would be to build on the Futures Survey, a large ongoing anonymous national

survey of people ages 16–24 carried out by the Department of Defense Joint Advertising, Market Research & Studies program to learn about the career and educational plans, perceptions, beliefs, and attitudes toward military enlistment of young Americans (United States Department of Defense, n.d.). Rather than remain anonymous, it would be beneficial to provide respondents in this survey the opportunity to link survey responses to subsequent data on enlistment, service characteristics, and other publicly available data after enlistment, as was done in the Army STARRS surveys (Heeringa et al., 2013). Given likely concerns that de-identification might lead to a lower response rate in the Futures Survey and/or changes in response patterns, an initial split ballot design might be used where half the sample completed the survey anonymously and the other half was offered the opportunity for de-identification. If this experiment showed that de-identification did not adversely affect response rates or data patterns, the Futures Survey could be used for more fine-grained investigations of associations between diverse psychological problems and subsequent enlistment. This information, once obtained, could then be used to investigate predictors of enlistment and to follow enlistees through service to determine the associations of these predictors with subsequent military performance.

Overall, in this study of 1989–2014 high-school seniors, school misbehavior and risk-taking emerged as predictors of military enlistment in the four years after graduation and there was no evidence of historical changes in these associations over the course of nearly three decades. However, we did not find interactions between school misbehavior, risk-taking, and the other MTF externalizing problems, suggesting that these predispositions that predict military enlistment are not part of a broader externalizing disorder. We also failed to find an association between internalizing problems and subsequent enlistment. Therefore, the

evidence from this study indicates that pre-enlistment psychological problems cannot fully explain the high rates of psychological disorders among enlisted military personnel. Further research addressing the limitations of this study is needed to determine whether a history of school misbehavior and risk-taking is associated with psychological disorders and negative outcomes during or after military service.

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The Army STARRS Team consists of Co-Principal Investigators: Robert J. Ursano, MD (Uniformed Services University of the Health Sciences) and Murray B. Stein, MD, MPH (University of California San Diego and VA San Diego Healthcare System)

Site Principal Investigators: Steven Heeringa, PhD (University of Michigan),

James Wagner, PhD (University of Michigan) and Ronald C. Kessler, PhD (Harvard Medical School)

Army liaison/consultant: Kenneth Cox, MD, MPH (US Army Public Health Center)

Other team members: Pablo A. Aliaga, MA (Uniformed Services University of the Health Sciences); COL David M. Benedek, MD (Uniformed Services University of the Health Sciences); Laura Campbell-Sills, PhD (University of California San Diego); Carol S. Fullerton, PhD (Uniformed Services University of the Health Sciences); Nancy Gebler, MA (University of Michigan); Robert K. Gifford, PhD (Uniformed Services University of the Health Sciences); Meredith House, BA (University of Michigan); Paul E. Hurwitz, MPH (Uniformed Services University of the Health Sciences); Sonia Jain, PhD (University of California San Diego); Tzu-Cheg Kao, PhD (Uniformed Services University of the Health Sciences); Lisa Lewandowski-Romps, PhD (University of Michigan); Holly Herberman Mash, PhD (Uniformed Services University of the Health Sciences); James E. McCarroll, PhD, MPH (Uniformed Services University of the Health Sciences); James A. Naifeh, PhD (Uniformed Services University of the Health Sciences); Tsz Hin Hin Ng, MPH (Uniformed Services University of the Health Sciences); Matthew K. Nock, PhD (Harvard University); Nancy A. Sampson, BA (Harvard Medical School); CDR Patcho Santiago, MD, MPH (Uniformed Services University of the Health Sciences); LTC Gary H. Wynn, MD (Uniformed Services University of the Health Sciences); and Alan M. Zaslavsky, PhD (Harvard Medical School).

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DECLARATION OF INTEREST

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DATA AVAILABILITY STATEMENT

The MTF restricted-use and public-use annual cross-sectional survey data is available on the National Addiction & HIV Data Archive Program (NAHDAP) website and may be accessed in the ICPSR Virtual Data Enclave (VDE) from the following website: <http://www.icpsr.umich.edu/icpsrweb/NAHDAP/series/00035>. Information about the study and MTF study results are available on the MTF study website: <http://www.monitoringthefuture.org/>

SUPPLEMENTARY MATERIAL

Supplemental data for this article can be accessed on publisher website.

ORCID

Carol Chu  <http://orcid.org/0000-0001-9406-5478>

Samantha L. Bernecker  <http://orcid.org/0000-0002-8803-3311>

Peter M. Gutierrez  <http://orcid.org/0000-0001-8981-8404>

Ronald C. Kessler  <http://orcid.org/0000-0003-4831-2305>

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