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SHORT TITLE: CHILDHOOD BULLYING AND SUICIDAL BEHAVIORS

**Associations of childhood bullying victimization with lifetime suicidal behaviors among  
new U.S. Army soldiers**

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## Abstract

**Background:** Prior studies have documented associations of childhood bullying victimization with suicidal behaviors. However, many failed to adjust for concomitant risk factors and none investigated this relationship in military personnel. This study aimed to estimate independent associations of childhood bullying victimization with suicidal behaviors among U.S. Army soldiers. **Methods:** Soldiers reporting for basic training completed a cross-sectional survey assessing mental disorders, suicidal behaviors, and childhood adversities including two types of bullying victimization: (1) Physical Assault/Theft and (2) Bullying Comments/Behaviors. Associations of childhood bullying experiences with suicidal behaviors were estimated using discrete-time survival analysis of person-year data from 30,436 soldiers. Models adjusted for socio-demographic factors, childhood maltreatment by adults, and mental disorders. **Results:** After comprehensive adjustment for other risk factors, more frequent Physical Assault/Theft by peers during childhood was associated with increased odds of lifetime suicidal ideation (AOR=1.18, 95% CI 1.11-1.26,  $p<.001$ ) and attempt (AOR=1.30, 95% CI 1.13-1.50,  $p<.001$ ). More frequent Bullying Comments/Behaviors were associated with increased risk of ideation (AOR=1.30, 95% CI 1.26-1.35,  $p<.001$ ), plan (AOR=1.44, 95% CI 1.35-1.54,  $p<.001$ ), attempt (AOR=1.24, 95% CI 1.15-1.33,  $p<.001$ ); and onset of plan among ideators (AOR=1.09, 95% CI 1.03-1.15,  $p=.002$ ). Relative to no bullying victimization, exposure to the most persistent bullying was associated with 2- to 4-fold increases in risk for suicidal behaviors. **Conclusions:** Childhood bullying victimization is associated with lifetime suicidal behaviors among new soldiers. Exposure to bullying comments/behaviors during childhood is associated with progression from suicidal ideation to plan. Improved recognition of these relationships may inform risk mitigation interventions for soldiers.

## Introduction

Suicide is the second-leading cause of death among young adults in the U.S. (Centers for Disease Control and Prevention, 2016). While suicide fatalities remain rare events, an estimated 7.5% of adults aged 18-25 thought seriously about suicide, 2.3% developed a plan, and 1.2% attempted suicide in 2014 (Lipari, Piscopo, Kroutil, & Miller, 2015). Non-fatal suicidal behaviors are more prevalent among young adults than in the overall adult population (Crosby et al., 2011; Lipari et al., 2015)

Understanding risk in one group of young adults – new military recruits – is critical to efforts to reduce suicide in the Armed Forces (Kuehn, 2009; Nock et al., 2013; Ressler & Schoemaker, 2014). The suicide rate of Army soldiers began climbing in 2005 and exceeded the adjusted general population rate for the first time in 2008 (Armed Forces Health Surveillance Center, 2012; Nock et al., 2013). It remains higher than historical rates observed prior to 2003 (Pruitt et al., 2015). Differences in prevalence of certain traumas (Afifi et al., 2016; Blossnich, Dichter, Cerulli, Batten, & Bossarte, 2014; Katon et al., 2015) and mental disorders (Rosellini et al., 2015) may impact the phenomenology of suicide and non-fatal suicidal behaviors in soldiers.

The Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Kessler, Colpe, et al., 2013; Ursano et al., 2014) included a New Soldier Study (NSS) that assessed mental disorders, suicidal behaviors, and potential risk and protective factors among more than 38,000 soldiers reporting for Basic Combat Training. Prevalence of lifetime suicidal ideation, plan, and attempt among NSS respondents was 14.1%, 2.3%, and 1.9%, respectively (Ursano et al., 2015). Certain socio-demographic characteristics (e.g., being female, unmarried) and mental disorders (e.g., posttraumatic stress disorder, bipolar disorder) were associated with increased risk for suicidal behaviors (Nock et al., 2015; Ursano et al., 2015). Childhood maltreatment – a key distal risk factor (Borges et al., 2010; Bruffaerts et

al., 2010; Dube et al., 2001; Enns et al., 2006; Turecki & Brent, 2015) – also displayed strong associations with suicidal behaviors (Stein et al., in press).

Accumulating evidence suggests that childhood victims of peer aggression (i.e., bullying) display increased risk for suicidal behaviors (Geoffroy et al., 2016; Undheim & Sund, 2013) even into adulthood (Brunstein Klomek, Sourander, & Gould, 2010; Lereya, Copeland, Costello, & Wolke, 2015; Takizawa, Maughan, & Arseneault, 2014). A recent meta-analysis found moderate-sized, positive associations between childhood bullying victimization and suicidal behaviors (Holt et al., 2015), but noted many studies failed to adequately control for concomitant risk factors that might explain this relationship. Additionally, the relationship of childhood bullying victimization to suicidal behaviors has not been examined in military samples. Prior studies of other adverse childhood experiences (e.g., maltreatment) have noted disparities in both prevalence of these adversities and their associations with mental health outcomes in servicemembers versus civilians (Afifi et al., 2016; Blosnich et al., 2014; Katon et al., 2015). Such findings imply that results from civilian samples cannot simply be extrapolated to military populations, and that investigation of the relationship of childhood bullying victimization to suicidal behaviors among servicemembers is needed.

The objective of this study was to estimate associations of childhood bullying victimization with lifetime suicidal behaviors among new U.S. Army soldiers, adjusting for socio-demographic variables, childhood maltreatment, and mental disorders. We further extended the literature by examining whether bullying history related to course of suicidal behaviors (progression to plan and attempt) among those with suicidal ideation.

## **Materials and Methods**

### **Study Sample**

The NSS is based on a cross-sectional survey conducted at three Army installations from April 2011 to November 2012. Soldiers were surveyed while completing intake procedures prior to Basic Combat Training. Samples of 200-300 new soldiers at each site were selected on a continuous, weekly basis to attend a study overview and informed consent session. Sample sizes were proportional to the size of the cohorts at each installation, and study staff worked closely with Army coordinators to ensure samples were representative of all new soldiers in each weekly cohort. Recruitment, consent, and data protection procedures were approved by IRBs of all collaborating institutions. Other information regarding the NSS design and sampling can be found elsewhere (Kessler, Colpe, et al., 2013; Ursano et al., 2014).

Nearly all (99.9%) selected soldiers consented to, and 93.5% completed, the NSS self-administered questionnaire. Incomplete surveys were primarily due to time constraints (e.g., cohorts having to leave early). Most survey completers (77.1%) consented to linkage of responses to their Army/Department of Defense (DoD) administrative records. As in prior NSS studies (Rosellini et al., 2015; Stein et al., in press; Ursano et al., 2015) the sample for this analysis was constrained to respondents whose complete survey data were successfully linked to their Army/DoD records (n=38,507). This enabled incorporation of a combined analysis weight that – in addition to adjusting for differences between survey completers who did and did not consent to administrative record linkage – includes a post-stratification of these consent weights to known demographics and service traits of the population of soldiers attending Basic Combat Training during the study period. Detailed descriptions of NSS clustering and weighting are available in a prior report (Kessler, Heeringa, et al., 2013).

The current analyses utilized person-year data (see “Statistical Analysis”), which were restricted to 12-33 years of age due to exceedingly low prevalence of suicidal behavior before age 12 and of enlistment after age 33. This limited the sample to respondents with age-at-

enlistment at or below the 99<sup>th</sup> percentile ( $\leq 33$  years;  $n=38,237$ ). Because a key survey item assessing childhood bullying was added partway into NSS data collection, the sample was further constrained to respondents who were administered both bullying items ( $n=30,436$ ; 4,817 females).

## Measures

**Bullying.** Two items assessed bullying victimization. The first inquired how often, up through age 17, *you were beaten up, had things stolen from you, or were terrorized by bullies at school or in the neighborhood* (Never, Rarely, Sometimes, Often, or Very Often; coded 0-4). The second asked how many times *you were bullied (ongoing comments or behaviors) during childhood or adolescence* (0, 1, 2-4, 5-9, or 10 or more; coded 0-4). These ratings had limited internal consistency ( $\alpha=.57$ ) and were treated as separate variables. Henceforth the two variables are referred to as Physical Assault/Theft and Bullying Comments/Behaviors.

**Suicidal Behaviors.** Suicidal behaviors were assessed using a modified self-report version of the Columbia Suicidal Severity Rating Scale (Posner et al., 2011). Lifetime ideation was considered present if respondents endorsed thoughts of killing themselves, or wishing they were dead or would go to sleep and never wake up. Respondents who endorsed ideation were asked about intent and those with intent were asked about plan(s). Lifetime plan was considered present if respondents endorsed thinking about methods of ending their lives or developing plans for how to kill themselves. All who reported ideation were asked if they had ever attempted suicide; lifetime attempt was judged present if respondents endorsed ever purposefully hurting themselves with intention to die.

**Socio-demographic and Army service variables.** Models adjusted for person-year, education, sex, race-ethnicity, religion, marital status, parental education, and nativity. We



also controlled for two Army service variables: service component (Regular Army, National Guard, or Army Reserve) and site of Basic Combat Training.

**Maltreatment Profile.** A separate report explains derivation of the Maltreatment Profile variable (Stein et al., in press). Briefly, empirically-derived Sexual Abuse, Physical Abuse, Emotional Abuse, Physical Neglect, and Emotional Neglect scales ( $\alpha=.73-.94$ ) were used as indicators for a latent profile analysis. Results supported a 5-class model. Proportions of NSS respondents classified as experiencing No Maltreatment, Episodic Emotional Maltreatment, Frequent Emotional and Physical Maltreatment, Episodic Emotional and Sexual Abuse, and Frequent Emotional, Physical, and Sexual Maltreatment were 81.6%, 10.7%, 3.6%, 3.2%, and 0.9%, respectively (Stein et al., in press).

**Mental disorders.** Validation of *DSM-IV* diagnostic variables was the focus of a previous Army STARRS report (Kessler, Santiago, et al., 2013). Included here were: lifetime major depressive disorder, mania/hypomania, generalized anxiety disorder, panic disorder, posttraumatic stress disorder, intermittent explosive disorder, conduct disorder, oppositional defiant disorder, and substance use disorder; and persistent attention deficit-hyperactivity disorder (symptomatic during the preceding 6 months). Number of lifetime disorders also was included to provide a global assessment of psychiatric comorbidity.

### Statistical Analysis

Discrete-time survival analysis, with person-year the unit of analysis and a logistic link function (Efron, 1988), was used to estimate associations of the Physical Assault/Theft and Bullying Comments/Behaviors variables with onset of suicidal ideation, plan, and attempt. To investigate the relationship of childhood bullying victimization with course of suicidal behavior, additional models evaluated associations of the bullying variables with

onset of suicide plan following ideation (“plan among ideators”), attempt following ideation with a plan (“planned attempt”); and attempt following ideation without a plan (“unplanned attempt”).

A sequential approach to modeling was undertaken to elucidate impacts of adjustment for other key risk factors on associations of the bullying variables with suicidal behavior outcomes. The series of models adjusted for (1) socio-demographic variables, (2) childhood maltreatment profile, and (3) mental disorders with age-of-onset prior to emergence of each suicidal behavior. Ages-of-onset of bullying and maltreatment were not collected; these were assumed to have occurred prior to each suicidal behavior. Missing bullying and maltreatment data were uncommon (<3%) and coded “0” to produce conservative estimates of associations. Survival coefficients were exponentiated to create ORs with 95% CIs. Population attributable fractions estimated proportions of cases of each suicidal behavior that might have been avoided (net of covariates) had bullying not occurred. Because NSS data were clustered and weighted, the design-based Taylor series linearization method was used to estimate standard errors. Multivariable significance was examined using design-based Wald  $X^2$  tests. Two-tailed  $p < .05$  was considered significant. Analyses were conducted using R Version 3.0.2 (R Core Team, 2013) with the R library *survey* (Lumley, 2004, 2012) for discrete-time survival models.

## Results

Nearly 1 in 5 new soldiers (18.72%, SE=0.27%) endorsed Physical Assault/Theft by peers during childhood; with 4.29% (SE=0.12%) indicating that this occurred often or very often. One-third (33.15%; SE=0.35%) of soldiers endorsed Bullying Comments/Behaviors during childhood, with 13.13% (SE=0.27%) reporting that this occurred 5 or more times.

Table 1 shows prevalence of suicidal behaviors by frequency of childhood bullying

victimization. While some response categories were collapsed for descriptive analyses, the original 0-4 frequency metrics of the bullying variables were retained for all other analyses reported below.

Physical Assault/Theft and Bullying Comments/Behaviors were moderately correlated ( $\rho=.41$ ;  $p<.001$ ). Kruskal-Wallis  $H$  tests revealed that both Physical Assault/Theft by peers [ $\chi^2(4)=4236.94$ ;  $p<.0001$ ] and Bullying Comments/Behaviors [ $\chi^2(4)=1524.92$ ;  $p<.0001$ ] were strongly associated with Maltreatment Profile (Appendix Figures 1 and 2).

### **Associations of Childhood Bullying Victimization with Suicidal Behaviors**

Separate discrete-time survival analyses (Table 2) were run to model associations of Physical Assault/Theft and Bullying Comments/Behaviors with each outcome, adjusting for socio-demographic and Army service variables. Both types of childhood bullying victimization were associated with increased odds of lifetime ideation, plan, and attempt (AORs=1.46 to 1.74;  $ps<.001$ ). When ideation was present, Physical Assault/Theft (AOR=1.18; 95% CI 1.10-1.27;  $p<.001$ ) and Bullying Comments/Behaviors (AOR=1.15; 95% CI 1.09-1.20;  $p<.001$ ) were associated with onset of suicide plan. Physical Assault/Theft also was associated with suicide attempts following ideation with a plan (“planned attempt”; AOR=1.17; 95% CI 1.06-1.29;  $p=.003$ ) and without a plan (“unplanned attempt”; AOR=1.18; 95% CI 1.05-1.33;  $p=.007$ ). Frequency of exposure to Bullying Comments/Behaviors was not associated with planned or unplanned attempts ( $ps>.12$ ).

### **Effects of Adjustment for Maltreatment Profile**

The next models estimated joint effects of Physical Assault/Theft, Bullying Comments/Behaviors, and Maltreatment Profile with suicidal behaviors. Models first incorporated main effects of Maltreatment Profile, then became more complex with addition of interactions of Maltreatment Profile with each bullying variable. Interactions of Physical Assault/Theft with Bullying Comments/Behaviors were considered, but were non-significant

for all outcomes. Results of interim models are summarized below, with full results in Appendix Tables 1-6.

#### **Joint associations of Maltreatment Profile and Physical Assault/Theft.**

Introduction of controls for maltreatment resulted in weakened associations of Physical Assault/Theft with suicidal behaviors. Odds-ratios for Physical Assault/Theft decreased but remained significant ( $ps < .001$ ) for lifetime ideation (AOR=1.28; 95% CI 1.23-1.32), plan (AOR=1.29; 95% CI 1.18-1.41), and attempt (AOR=1.30; 95% CI 1.20-1.41). Physical Assault/Theft was no longer associated with plans among ideators, planned attempts, or unplanned attempts ( $ps > .06$ ).

#### **Joint associations of Maltreatment Profile and Bullying Comments/Behaviors.**

Adjustment for Maltreatment Profile resulted in slight attenuation of odds-ratios of Bullying Comments/Behaviors. Associations of Bullying Comments/Behaviors with ideation (AOR=1.36; 95% CI 1.32-1.39), plan (AOR=1.43; 95% CI 1.36-1.51), attempt (AOR=1.37; 95% CI 1.28-1.47), and plan among ideators (AOR=1.11; 95% CI 1.06-1.17) remained significant ( $ps < .001$ ).

**Joint associations of Maltreatment Profile, Physical Assault/Theft, and Bullying Comments/Behaviors.** Previous models examined Physical Assault/Theft and Bullying Comments/Behaviors separately. The next set estimated joint associations of Maltreatment Profile, Physical Assault/Theft, and Bullying Comments/Behaviors with ideation, plan, attempt, and plan among ideators. More complex models of planned and unplanned attempts were not pursued, as neither type of bullying was associated with these outcomes after adjustment for maltreatment.

Odds-ratios for Physical Assault/Theft again decreased in magnitude; with only those for lifetime ideation (AOR=1.09; 95% CI 1.05-1.13;  $p < .001$ ) and attempt (AOR=1.13; 95% CI 1.04-1.23;  $p = .004$ ) remaining significant. Associations of Bullying Comments/Behaviors

with ideation (AOR=1.33; 95% CI 1.29-1.37), plan (AOR=1.40; 95% CI 1.32-1.49), attempt (AOR=1.33; 95% CI 1.24-1.42), and plan among ideators (AOR=1.11; 95% CI 1.04-1.17) decreased minimally and remained significant ( $ps < .001$ ).

**Interaction models.** We next added Physical Assault/Theft x Maltreatment Profile and Bullying Comments/Behaviors x Maltreatment Profile interactions to the models. Both Physical Assault/Theft x Maltreatment Profile [ $X^2(4)=21.28, p < .001$ ] and Bullying Comments/Behaviors x Maltreatment Profile [ $X^2(4)=11.61, p = .020$ ] were associated with lifetime ideation. Bullying Comments/Behaviors x Maltreatment Profile was associated with plan [ $X^2(4)=10.96, p = .027$ ], while Physical Assault/Theft x Maltreatment Profile was associated with attempt [ $X^2(4)=11.39, p = .022$ ]. Neither interaction was associated with plans among ideators ( $ps > .13$ ). Odds-ratios of all significant interactions were  $< 1$ . Models that disaggregated these interactions indicated that they reflected moderation of predictive effects of bullying by any maltreatment versus none (i.e., No Maltreatment versus other profiles). Interactions of Physical Assault/Theft and Bullying Comments/Behaviors with specific profile (when maltreatment was present) were non-significant ( $ps > .09$ ).

Table 3 shows final models of the joint associations of Physical Assault/Theft, Bullying Comments/Behaviors, and Maltreatment Profile with suicidal behaviors. Physical Assault/Theft (AOR=1.20; 95% CI 1.13-1.28;  $p < .001$ ) and Bullying Comments/Behaviors (AOR=1.36; 95% CI 1.31-1.40;  $p < .001$ ) displayed independent associations with lifetime ideation. Negative interactions of Maltreatment Profile with Physical Assault/Theft (AOR=0.86; 95% CI 0.79-0.92;  $p < .001$ ) and with Bullying Comments/Behaviors (AOR=0.94; 95% CI 0.89-0.98;  $p = .005$ ) indicate that associations of both types of bullying with ideation were weaker among victims who also were maltreated by adults.

Bullying Comments/Behaviors was associated with lifetime plan (AOR=1.56; 95% CI 1.46-1.67;  $p < .001$ ) and its negative interaction with Maltreatment Profile (AOR=0.85; 95%

CI 0.78-0.93;  $p < .001$ ) indicates that this association was attenuated among victims who were also maltreated by adults. Bullying Comments/Behaviors also were independently associated with onset of plans among ideators (AOR=1.11; 95% CI 1.06-1.17;  $p < .001$ ).

Physical Assault/Theft (AOR=1.35; 95% CI 1.15-1.57;  $p < .001$ ) and Bullying Comments/Behaviors (AOR=1.31; 95% CI 1.22-1.40;  $p < .001$ ) displayed independent associations with lifetime attempt. The interaction of Maltreatment Profile with Physical Assault/Theft (AOR = 0.80; 95% CI 0.68-0.94;  $p < .001$ ) signifies that the association of Physical Assault/Theft with suicide attempt was weaker among victims who were also maltreated by adults.

### Effects of Adjustment for Mental Disorders

Adjustment for type and number of mental disorders had a modest impact on the odds-ratios of Physical Assault/Theft and Bullying Comments/Behaviors (AOR $_{\Delta}$ =-0.02 to -0.12; Table 4). Exponentiation of odds-ratios from these fully adjusted models indicates that persistent (*Very Often*) Physical Assault/Theft was associated with 1.95 times the risk of lifetime ideation and 2.88 times the risk of lifetime attempt, relative to no exposure to Physical Assault/Theft by peers. Persistent (*10 or more times*) Bullying Comments/Behaviors were associated with 2.88 times the risk of ideation, 4.31 times the risk of plan, 2.34 times the risk of attempt, and 1.41 times the risk of plan following ideation, relative to no exposure to Bullying Comments/Behaviors.

Population attributable fractions for models in Table 4 implicated childhood bullying victimization in 24.3% of cases of ideation; 33.4% of plans; 31.6% of attempts; and 11.7% of plans among ideators. Exposure to bullying *or* maltreatment was implicated in 41.1% of cases of ideation; 57.0% of plans; 55.2% of attempts; and 22.3% of plans among ideators.

### Discussion

Associations between childhood bullying victimization and lifetime suicidal behaviors – previously observed in civilian samples – are evident among incoming U.S. Army soldiers after adjusting comprehensively for socio-demographic variables, childhood maltreatment, and mental disorders predating the suicidal behaviors. More frequent exposure to bullying comments and/or behaviors during childhood was associated with increased risk of lifetime suicidal ideation, plan, and attempt. Greater exposure to physical assault/theft by peers was independently associated with increased risk of lifetime suicidal ideation and attempt.

While childhood bullying victimization was associated with a range of suicidal behaviors in this cohort, its relationship to progression of suicidal behavior was more circumscribed. When ideation was present, odds of subsequently planning suicide increased as childhood exposure to bullying comments/behaviors intensified. However, once predictive effects of maltreatment were accounted for, neither bullying comments/behaviors nor physical assault/theft by peers was associated with progression from suicide plan to attempt, or from ideation to unplanned attempt. Although our analysis cannot establish a causal relationship between childhood exposure to bullying comments/behaviors and suicide planning, it is possible that aspects of this adversity (e.g., public “shaming”; social rejection) could leave victims more vulnerable to serious contemplation of suicide that includes development of a plan. The relationship between bullying comments/behaviors and suicide planning merits further investigation.

Childhood adversities frequently cluster together (Finkelhor, Turner, Shattuck, & Hamby, 2015; Kessler et al., 2010) making it challenging to isolate unique predictive effects of specific traumas on mental health (Vachon, Krueger, Rogosch, & Cicchetti, 2015). Among new soldiers, bullying victimization was strongly associated with maltreatment by adults. Because maltreatment is a well-established risk factor for suicidal behaviors, it was imperative to account for this exposure in estimating associations of bullying with suicidal

behaviors. Adjustment for maltreatment profile resulted in substantial attenuation of associations of Physical Assault/Theft with lifetime suicidal behaviors, but not of the associations of Bullying Comments/Behaviors with these outcomes. This discrepancy may be due to greater overlap in this cohort between experiences of childhood maltreatment and being beaten up, stolen from, or terrorized by bullies at school or in the neighborhood (Appendix Figure 1) versus between experiences of maltreatment and being bullied with ongoing comments and/or behaviors (Appendix Figure 2).

Several negative interactions between childhood bullying and maltreatment variables were observed, reflecting that in some cases the predictive effects of maltreatment profile and level of bullying victimization on risk for suicidal behaviors were not fully additive. Despite these small negative interactions, soldiers who were both maltreated by adults and bullied by peers had substantially higher estimated odds of suicidal behaviors than those who experienced only one of these adversities.

It has recently been suggested that impacts of bullying on mental health may be even greater than those of maltreatment. Longitudinal studies of U.S. and U.K. cohorts found that children who were bullied by peers had higher rates of anxiety, depression, and self-harm (not necessarily accompanied by suicidal intent) in adulthood than did children who were maltreated by adults; and harmful effects of maltreatment were primarily detected among children who also were bullied (Lereya et al., 2015). In contrast, the current results indicate that childhood maltreatment – previously found to be strongly associated with suicidal behaviors in this cohort (Stein et al., in press) – remains independently associated with onset and worsening course of suicidal behaviors [i.e., progressions from ideation to plan; plan to attempt; and ideation to unplanned attempt] when predictive effects of maltreatment and bullying are jointly modeled. Childhood bullying exposures, on the other hand, did not independently contribute to prediction of planned or unplanned attempts among those with



ideation, and the association of Bullying Comments/Behaviors with onset of suicide planning among ideators was relatively modest.

Population attributable fractions suggested that had bullying *not* occurred, about one-quarter of cases of ideation and one-third of plans and attempts might have been prevented. An important caveat is that population attributable fractions assume causal relations between predictor and outcome variables; and our cross-sectional data cannot establish causality. Nevertheless, these estimates raise the possibility that successful efforts to reduce bullying could meaningfully impact rates of suicidal behaviors.

Lacking a demographically-matched civilian sample, the current investigation could not evaluate whether individuals who enlist in the U.S. Army have lower/higher prevalence of childhood bullying victimization than civilians; or whether associations of bullying victimization with suicidal behaviors are stronger/weaker in new soldiers versus others. These remain important questions for future study. Previous studies have found higher prevalence of other childhood adversities (e.g., maltreatment; exposure to household domestic violence) in servicemembers versus civilians (Afifi et al., 2016; Blosnich et al., 2014; Katon et al., 2015). Disparities in relationships between childhood adversities and mental health outcomes in servicemembers versus civilians also have been reported. Less pronounced associations of child abuse exposure with suicidal behaviors were observed in Canadian military personnel versus civilians (Afifi et al., 2016) and weaker associations of number of childhood adversities with poor mental health days were observed among American men with history of military service versus male civilians (Katon et al., 2015).

Considerable differences in sample characteristics, measurement of childhood bullying victimization, and other aspects of study design limit the utility of comparisons of prevalence of childhood bullying victimization reported here for the NSS cohort to that found in studies of general population samples (e.g., Lereya et al., 2015; Takizawa et al., 2014).

However, certain convergences with results of these general population-based studies are apparent; and suggest that childhood bullying victimization is associated with childhood maltreatment exposure and with increased risk of suicidal behaviors, regardless of civilian versus military status.

Several limitations must be considered in interpreting the current results. Assessment of childhood bullying relied on retrospective self-report and is vulnerable to reporting and recall biases. Additionally, single-item ratings were used to estimate severity of Physical Assault/Theft by peers and Bullying Comments/Behaviors. While single-item assessment of bullying is not uncommon in the literature (Holt et al., 2015), use of multi-item measures is preferable for psychometric reasons. The survey item assessing Bullying Comments/Behaviors did not specify the perpetrator(s); thus, some victimization by family members (e.g., siblings) could have been inadvertently captured. Certain forms of childhood bullying victimization (e.g., cyberbullying) were not specifically mentioned in the survey items and may not have been captured. Timing of bullying was not assessed and some suicidal behavior could have emerged prior to bullying victimization. This omission alongside the cross-sectional study design preclude causal inferences. Finally, findings pertaining to non-fatal suicidal behaviors cannot necessarily be extrapolated to improve understanding of risk for suicide death.

### **Conclusion**

Identifying risk factors for suicidal behaviors is integral to the multifaceted effort to reduce suicide in the U.S. military (Kuehn, 2009; Ressler & Schoomaker, 2014). Awareness of elevated risk for suicidal behaviors associated with childhood bullying victimization – and with certain socio-demographic factors (Ursano et al., 2015), mental disorders (Nock et al., 2015), and childhood maltreatment (Stein et al., in press) – among incoming Army soldiers may facilitate targeting of risk mitigation interventions for soldiers. Yet to be learned is

whether soldiers with histories of childhood bullying victimization would benefit from unique interventions to lower suicide risk; this remains an important topic for future study.

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Table 1

Weighted prevalence of lifetime suicidal behaviors by frequency of childhood bullying victimization

	Total Sample (N=30,436)			Among Lifetime Suicidal Behaviors (n=6,060)	
	Ideation	Plan	Attempt	Plan (n=4060)	Plan or Attempt (n=6060)
<b>Physical Assault/Theft</b>					
Never	10.5% (0.3%)	1.5% (0.1%)	1.2% (0.1%)	14.7% (0.8%)	39.7% (1.3%)
Rarely or Sometimes	23.3% (0.8%)	3.9% (0.3%)	3.0% (0.3%)	16.8% (1.3%)	49.1% (1.7%)
Often or Very Often	34.4% (1.3%)	9.3% (0.8%)	8.4% (0.7%)	26.9% (2.4%)	53.6% (2.0%)
<b>Bullying Comments/Behaviors</b>					
Never	8.8% (0.2%)	1.2% (0.1%)	1.1% (0.1%)	13.6% (0.8%)	42.8% (1.5%)
One to four times	16.8% (0.5%)	2.6% (0.2%)	1.9% (0.2%)	15.6% (1.3%)	47.9% (1.7%)
Five times or more	31.4% (0.9%)	6.8% (0.4%)	5.4% (0.4%)	21.6% (1.3%)	44.2% (1.6%)

*Note.* Values are weighted percentage (standard error). For this table, response options for Physical Assault/Theft were collapsed into Never ( $n=24,643$ ), Rarely or Sometimes ( $n=4477$ ), and Often or Very Often ( $n=1316$ ). Response options for Bullying

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Comments/Behaviors were collapsed into Never ( $n=20,210$ ), one to four times ( $n=6,115$ ), and five times or more ( $n=4,111$ ).

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Table 2

Associations between childhood bullying victimization and lifetime suicidal behaviors

	Total Sample (N=30,436)						Among Lifetime			
	Ideation		Plan		Attempt		Plan (n=4060)		Planned Attempt (n=625)	
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Physical Assault/Theft	<b>1.53***</b>	1.48- 1.57	<b>1.67***</b>	1.58- 1.78	<b>1.74***</b>	1.63- 1.86	<b>1.18***</b>	1.10- 1.27	<b>1.17**</b>	0.98- 1.37
Comments/ Behaviors	<b>1.46***</b>	1.42- 1.49	<b>1.59***</b>	1.51- 1.66	<b>1.54***</b>	1.44- 1.65	<b>1.15***</b>	1.09- 1.20	0.98	0.91- 1.05

*Notes.* AOR, adjusted odds ratio; CI, confidence interval. The metric of the Physical Assault/Theft and Bullying Comments/ Behaviors variables was a 0-4 frequency scale. Each cell displays the result of a separate discrete-time survival model where the row label denotes the predictor of interest and the column label denotes the outcome variable. Models adjusted for age, gender, race/ethnicity, marital status, religion, soldier and parental education level, nativity, service component, site of Basic Combat Training, and person-year. Boldface indicates statistical significance (\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ).

Table 3

Joint associations of childhood bullying victimization and maltreatment with suicidal behaviors<sup>a</sup>

	Total Sample (N=30,436)					
	Lifetime Ideation		Lifetime Plan		Lifetime Attempt	
	AOR	95% CI	AOR	95% CI	AOR	95% CI
Physical Assault/Theft	<b>1.20***</b>	1.13-1.28	-	-	<b>1.35***</b>	1.15-1.57
Bullying Comments/Behaviors	<b>1.36***</b>	1.31-1.40	<b>1.56***</b>	1.46-1.67	<b>1.31***</b>	1.22-1.40
Episodic Emotional Maltreatment <sup>b</sup>	<b>2.88***</b>	2.57-3.23	<b>3.78***</b>	2.90-4.91	<b>3.25***</b>	2.40-4.41
Frequent Emotional and Physical Maltreatment <sup>b</sup>	<b>3.30***</b>	2.84-3.82	<b>5.47***</b>	3.73-8.03	<b>4.86***</b>	3.55-6.66
Episodic Emotional and Sexual Abuse <sup>b</sup>	<b>3.76***</b>	3.16-4.47	<b>6.18***</b>	4.33-8.80	<b>6.52***</b>	4.76-8.92
Frequent Emotional, Physical, Sexual Maltreatment <sup>b</sup>	<b>4.52***</b>	3.32-6.14	<b>11.92***</b>	7.65-18.56	<b>11.97***</b>	7.26-19.74
Physical Assault/Theft x Any Maltreatment	<b>0.86***</b>	0.79-0.92	-	-	<b>0.80**</b>	0.68-0.94
Bullying Comments/Behaviors x Any Maltreatment	<b>0.94**</b>	0.89-0.98	<b>0.85***</b>	0.78-0.93	-	-



*Notes.* AOR = adjusted odds ratio; CI = confidence interval. The metric of the Physical Assault/Theft and Bullying Comments/ Behaviors variables was a 0-4 frequency scale. All discrete-time survival models adjusted for age, gender, ethnicity, marital status, religion, soldier and parental education level, nativity, service component, site of Basic Combat Training, and person-year. When interim models indicated lack of association of a bullying variable with a suicidal behavior, the bullying variable was excluded from the final model of that outcome (indicated by dashes in corresponding table cells). Boldface indicates statistical significance (\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ).

<sup>a</sup>Models of planned attempt and unplanned attempt are excluded because bullying variables were not associated with those outcomes after adjusting for Maltreatment Profile.

<sup>b</sup>Reference was the No Maltreatment profile.

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Table 4

Joint associations of childhood bullying victimization and maltreatment with suicidal behaviors,<sup>a</sup> adjusting for mental disorders

	Total Sample (N=30,436)					
	Lifetime Ideation		Lifetime Plan		Lifetime Attempt	
	AOR	95% CI	AOR	95% CI	AOR	95% CI
Physical Assault/Theft	<b>1.18***</b>	1.11-1.26	-	-	<b>1.30***</b>	1.13-1.50
Bullying Comments/Behaviors	<b>1.30***</b>	1.26-1.35	<b>1.44***</b>	1.35-1.54	<b>1.24***</b>	1.15-1.33
Episodic Emotional Maltreatment <sup>b</sup>	<b>2.42***</b>	2.14-2.74	<b>2.78***</b>	2.11-3.67	<b>2.40***</b>	1.77-3.26
Frequent Emotional and Physical Maltreatment <sup>b</sup>	<b>2.49***</b>	2.13-2.90	<b>3.34***</b>	2.21-5.04	<b>3.02***</b>	2.19-4.16
Episodic Emotional and Sexual Abuse <sup>b</sup>	<b>3.10***</b>	2.60-3.70	<b>3.93***</b>	2.56-6.05	<b>4.11***</b>	2.83-5.97
Frequent Emotional, Physical, and Sexual Maltreatment <sup>b</sup>	<b>2.98***</b>	2.12-4.18	<b>5.53***</b>	3.42-8.92	<b>5.49***</b>	3.19-9.45
Physical Assault/Theft x Any Maltreatment	<b>0.85***</b>	0.78-0.92	-	-	<b>0.80**</b>	0.68-0.93
Bullying Comments/Behaviors x Any Maltreatment	<b>0.95*</b>	0.90-1.00	<b>0.86**</b>	0.78-0.95	-	-

*Notes.* AOR = adjusted odds ratio; CI = confidence interval. The metric of the Physical Assault/Theft and Bullying Comments/ Behaviors variables was a 0-4 frequency scale. All discrete-time survival models adjusted for major depressive episode, mania/hypomania, generalized anxiety disorder, panic disorder, posttraumatic stress disorder, intermittent explosive disorder, conduct disorder, oppositional defiant disorder, substance use disorder and persistent attention deficit-hyperactivity disorder; number of mental disorders; age, gender, ethnicity, marital status, religion, soldier and parental education level, nativity, service component, site of Basic Combat Training, and person-year. When interim models indicated lack of association of a bullying variable with a suicidal behavior, the bullying variable was excluded from the final model of that outcome (indicated by dashes in corresponding table cells). Boldface indicates statistical significance ( $*p<.05$ ;  $**p<.01$ ;  $***p<.001$ ).

<sup>a</sup>Models of planned attempt and unplanned attempt are excluded because bullying variables were not associated with those outcomes after adjusting for Childhood Maltreatment Profile.

<sup>b</sup>Reference is the No Maltreatment profile.

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## Appendix Material

**Appendix Figure 1.** Endorsement of Childhood Physical Assault/Theft by peers among new soldiers with No Childhood Maltreatment ( $n=25,043$ ), Episodic Emotional Maltreatment ( $n=3215$ ), Frequent Emotional and Physical Maltreatment ( $n=1073$ ), Episodic Emotional and Sexual Abuse ( $n=875$ ), and Frequent Emotional, Physical, and Sexual Maltreatment ( $n=230$ ).

**Appendix Figure 2.** Endorsement of Childhood Bullying Comments/Behaviors by peers among new soldiers with No Childhood Maltreatment ( $n=25,043$ ), Episodic Emotional Maltreatment ( $n=3215$ ), Frequent Emotional and Physical Maltreatment ( $n=1073$ ), Episodic Emotional and Sexual Abuse ( $n=875$ ), and Frequent Emotional, Physical, and Sexual Maltreatment ( $n=230$ ).

**Appendix Table 1.** Associations of childhood bullying victimization and maltreatment with lifetime suicidal ideation ( $N=30,436$ ).

**Appendix Table 2.** Associations of childhood bullying victimization and maltreatment with lifetime suicide plan ( $N=30,436$ ).

**Appendix Table 3.** Associations of childhood bullying victimization and maltreatment with lifetime suicide attempt ( $N=30,436$ ).

**Appendix Table 4.** Associations of childhood bullying victimization and maltreatment with onset of plan among ideators ( $n=4060$ ).

**Appendix Table 5.** Associations of childhood bullying victimization and maltreatment with attempts among ideators with a plan (planned attempts;  $n=625$ ).

**Appendix Table 6.** Associations of childhood bullying victimization and maltreatment with attempts among ideators without a plan (unplanned attempts;  $n=3519$ ).

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