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Original Investigation

Substance Abuse and Other Adverse Outcomes for Military-Connected Youth in California

Results From a Large-Scale Normative Population Survey

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IMPORTANCE Military families and military-connected youth exhibit significant strengths; however, a sizeable proportion of these families appear to be struggling in the face of war-related stressors. Understanding the consequences of war is critical as a public health concern and because additional resources may be needed to support military families.

OBJECTIVE To determine whether rates of adverse outcomes are higher for military-connected adolescents during war compared with nonmilitary peers.

DESIGN, SETTING, AND PARTICIPANTS This study is a secondary data analysis of a large, normative, and geographically comprehensive administrative data set (2013 California Healthy Kids Survey) to determine whether military-connected youth are at risk for adverse outcomes, including substance use, experiencing violence and harassment, and weapon carrying, during wartime. These outcomes are of particular concern because they affect socioemotional adjustment and academic success. Data were collected in March and April 2013 and participants included 54 679 military-connected and 634 034 nonmilitary-connected secondary school students from public civilian schools in every county and almost all school districts in California.

MAIN OUTCOMES AND MEASURES Outcomes included lifetime and recent use of alcohol, tobacco, marijuana, prescription medications, and other drugs, as well as experiences of physical and nonphysical violence and harassment and weapon carrying during the last year.

RESULTS Multivariable logistic regression models indicated that military-connected youth had greater odds of substance use, experience of physical violence and nonphysical harassment, and weapon carrying. For example, military-connected youth had 73% greater odds of recent other drug use (eg, cocaine and lysergic acid diethylamide; odds ratio [OR], 1.73; 95% CI, 1.66-1.80) and twice the odds of bringing a gun to school (OR, 2.20; 95% CI, 2.10-2.30) compared with nonmilitary-connected peers. Their odds of being threatened with a weapon or being in a fight were also significantly higher than their civilian counterparts (OR, 1.87; 95% CI, 1.80-1.95 and OR, 1.67; 95% CI, 1.62-1.71, respectively).

CONCLUSIONS AND RELEVANCE Most military-connected youth demonstrate resilience. However, results suggest that during wartime, military-connected youth are at increased risk for adverse outcomes. Further, when compared with data from 2011, the rates of these negative outcomes appear to be increasing. These findings suggest a need to identify and intervene with military-connected adolescents and reflect a larger concern regarding the well-being of military families during wartime.

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Traditional examinations of the impact of war have focused on the direct effects of traumatic experiences on individuals. However, there is an emerging body of literature considering the extended effect of war on the families of those who are or may be called on to fight. Military families and youth possess significant strengths including flexibility, a sense of purpose, a supportive community, and access to many resources.¹ Further, the military offers its families many supports including consistent employment, health care, and a network of families that face similar stressors.² Many military families appear to respond to the stressors they face with resilience.³ Nevertheless, a sizeable proportion appears to struggle in response to war-related stressors. For military-connected youth, these issues include separation from parents owing to deployment, worry about future deployments, fear for the well-being of family members, frequent relocations, and exposure to the physical and mental health consequences of combat.⁴ These stressors may influence outcomes for military-connected youth.

Military youth and families have been defined in different ways. Using a strict definition including the spouses and dependents of active-duty and reserve personnel,¹ there are currently more than 1 million school-aged children with parents serving in the military⁵ and nearly 2 million when including children younger than 5 years.⁶ Increasingly, researchers suggest that children of veterans should also be considered military connected.^{7,8} When including veterans' families, the Military Child Educational Coalition estimates there are 4 million US children whose parents served at some time since 2001.⁹ Although strengths outweigh risks for most military youth, potential adverse outcomes associated with exposure to parental military service during wartime are critical both as a public health concern and because resources may be needed to assist these families.

Difficulties that are of concern for all school-aged children, including substance use, experience of violence and harassment, and weapon carrying, may be more likely among children from military families and particularly those who have experienced parental deployment during wartime.¹⁰⁻¹² To date, evidence suggesting that military youth are at greater risk for these outcomes has been drawn from smaller, convenience, or clinical samples, leaving open questions regarding whether military connectedness and parental deployment are associated with adverse outcomes. In this study, we used a large, normative, and geographically comprehensive data set to clarify these relationships and determine more definitively whether military-connected adolescents should be viewed as being at higher risk. Conclusions from these efforts may allow for more effective prevention and intervention with this population.

A growing body of evidence suggests that stressors associated with war-related events may predispose youth to adverse outcomes.¹⁰⁻¹⁷ This stream of research is consistent with family systems theory, which suggests that the experiences of a military-connected parent will affect the functioning of youth in that family system.¹⁸ Although some studies have considered the impact of military life during wartime,^{12,17,19} to our knowledge, most researchers have examined negative outcomes associated specifically with deployments.^{1,7,20} These

At a Glance

- This study used a large (N = 688 713), normative, and geographically comprehensive California data set to determine whether military-connected adolescents are at higher risk for adverse outcomes during wartime, including substance use, experience of violence and harassment at school, and weapon carrying, compared with their civilian peers.
- Odds of recent and lifetime substance use, experience of violence and harassment, and weapon carrying are on average 50%, 40%, and 90% greater, respectively, for military-connected youth compared with nonmilitary peers.
- Most military-connected youth appear to respond resiliently to war-related stressors.
- Results highlight the need for a prevention approach to reduce substance use and experience of violence and harassment for both military and nonmilitary students in civilian schools.

studies have examined the psychosocial functioning of children during the deployment of a parent^{4,14} or following 1 or multiple deployments.^{11,13,21} Although many military-connected youth fare relatively well despite stressors, these studies concluded that a sizeable proportion appears to struggle with experiences of deployment and other war-related stressors. In particular, deployment has been associated with increased substance use^{11,22} and social difficulties including higher risks for violence, harassment, and weapon carrying.^{11,12,17,21} Despite these findings regarding the impact of deployment, the relationship between wartime military connectedness and consequences for adolescents requires further clarification. Evaluating outcomes for military-connected youth in normative, civilian contexts, such as schools, may provide a more nuanced understanding of the functioning of these youth.²³

This study used the 2013 statewide administration of the California Healthy Kids Survey (CHKS) to compare rates of substance use, experience of physical violence and nonphysical harassment, and weapon carrying among military- and nonmilitary-connected adolescents. California is one of few states that asks school-aged children whether they are military connected. Using the CHKS, it is possible to disaggregate school health data for military students and examine differences between California students from military families and their peers. Given evidence suggesting increases in externalizing behaviors among military-connected adolescents, we hypothesized that these adolescents would report higher rates of both lifetime and recent use of tobacco, alcohol, marijuana, other drugs, and prescription drugs, as well as higher rates of physical and nonphysical violence and harassment and weapon carrying compared with nonmilitary-connected students.

Methods

Data and Participants

Data for this study were drawn from the 2013 administration of the CHKS in 256 school districts across California and were collected in March and April 2013. The CHKS was developed

by WestEd under contract to the California Department of Education and is administered biennially to all public school students in fifth, seventh, ninth, and 11th grades. Written parental consent was given for all seventh- through 11th-grade participants, as required by the California Department of Education. The sampling frame requested by the California Department of Education required that participating districts survey a representative district-wide, grade-level sample of students.²⁴ Further information regarding the administration of the CHKS has been described elsewhere.²⁵ The present analyses excluded fifth graders because they were not asked detailed questions regarding substance use. The final analytic sample consisted of 688 713 secondary school students (85% response rate) representing every county and almost all school districts in California. This secondary data analysis was reviewed by the institutional review board at the University of Southern California and deemed exempt.

Measures

Independent Variables and Potential Confounders

Students were defined as military connected if they answered yes to the following question: "Is your father, mother, or caretaker currently in the military (Army, Navy, Marines, Air Force, National Guard, or Reserves)?" Sex (male or female), grade (seventh, ninth, 11th, or nontraditional), and race/ethnicity (black, white, Latino, mixed, and other) were included in models as potential confounders.

Dependent Variables

Dependent variables included lifetime and recent (previous 30 days) use of cigarettes, alcohol, tobacco, other drugs, and prescription drugs. The other drug category included inhalants, cocaine or crack, methamphetamine, or lysergic acid diethylamide. The prescription drug category included painkillers, barbiturates, tranquilizers, cold medicine, Ritalin, and Adderall. The survey instrument included instructions to only consider use of these drugs with the intention of getting high or for purposes other than those prescribed by a doctor. Students were classified as having used alcohol, tobacco, or marijuana if they endorsed any use. Further, they were classified as using prescription or other drugs if they endorsed the use of any of the substances included in those categories. Recent use of prescription medications was not assessed by the CHKS. Complete measures are included in eAppendix 1 in the Supplement.

Dependent variables also included measures of in-school experiences of physical violence (eg, being pushed, shoved, or slapped), nonphysical harassment (eg, having rumors spread about the respondent), and weapon carrying (eg, carrying a gun), which were assessed with 3 scales that are presented in eAppendix 1 in the Supplement. If students indicated any physical or nonphysical violence or harassment or weapon carrying, they were categorized as experiencing the outcome. Summary categories were also created to represent the presence or absence of these experiences.

Statistical Methods

Standard descriptive statistics were used to compare demographic characteristics and adverse outcomes between mili-

tary- and nonmilitary-connected youth. Multivariable logistic regression was chosen as the appropriate statistical technique because outcome variables were binary and the resulting odds ratios (ORs) are an accepted way of describing elevated risk in vulnerable populations. Multivariable logistic regression was used to predict the odds of lifetime and recent substance use and experiencing violence, harassment, or weapon carrying among military- vs nonmilitary-connected youth. To account for correlation arising from students clustered in school districts, we used a Taylor series linearization method for variance estimation.^{26,27} All models were adjusted for sex, grade, and race/ethnicity. SAS version 9.4 (SAS Institute Inc) was used to analyze data.

Because data on socioeconomic status (SES) were not available, 2 methods were used to ensure that SES was not confounding results. First, correlations were calculated between the proportion of military-connected students and the proportion of students eligible for free and reduced-price lunch in a given school. Second, a sensitivity analysis was conducted to determine whether including SES in models had the potential to attenuate results.²⁸ Details on the methods used to perform the sensitivity analysis are presented in eAppendix 2 in the Supplement.

Results

Sample demographics are presented in Table 1. Latino students composed the largest percentage of our sample (51.36%), and 7.94% of students endorsed having a parent in the military. Students were evenly split between grades, with a small percentage (2.6%) in nontraditional academic settings. Student reports of lifetime substance use ranged from 15.66% for other drugs to 39.7% for alcohol. Reports of recent substance use ranged from 8.69% for cigarettes to 21.66% for alcohol. More than half of the sample (52.52%) reported any physical violence, 59.23% reported any nonphysical harassment, and 10.53% reported bringing a weapon to school. Differences by military connectedness across demographic and outcome variables were assessed using χ^2 tests. These results are presented in Table 1 and Table 2. Military-connected students reported higher levels of lifetime and recent substance use, violence, harassment, and weapon carrying compared with nonmilitary-connected students. For example, 45.22% of military-connected youth reported lifetime alcohol use compared with 39.23% of their nonmilitary peers. Regarding recent use, 12.18% of military-connected youth reported smoking cigarettes during the previous 30 days compared with 8.39% of their nonmilitary peers. Regarding violence, 62.51% of military-connected students reported any physical violence compared with 51.62% of nonmilitary-connected students, and 17.68% of military students reported carrying a weapon at school compared with 9.88% of nonmilitary students. All χ^2 tests were significant at $P < .001$.

Substance use ORs associated with military connectedness are presented in Table 2; other outcomes from all multivariable logistic regression models are presented in eTables 1, 2, 3, and 4 in the Supplement. With regard to lifetime use, the

Table 1. Demographic Information for Military- and Nonmilitary-Connected Youth^a

Characteristic	Overall, No. (%)	Connected, %	
		Military	Nonmilitary
Parents	688 713 (100)	7.94	92.06
Sex			
Male	341 025 (49.64)	53.58	49.30
Female	336 086 (50.36)	46.42	50.70
Race/ethnicity			
White	143 811 (21.40)	17.10	21.77
Black	25 273 (3.76)	4.55	3.69
Latino	345 142 (51.36)	52.22	51.28
Other	87 213 (12.98)	14.59	12.84
Mixed	70 594 (10.50)	11.54	10.42
Grade			
Seventh	208 045 (33.88)	39.70	33.37
Ninth	205 172 (33.41)	32.36	33.51
11th	184 856 (30.10)	24.63	30.58
Nontraditional	15 972 (2.60)	3.32	2.54

^a All χ^2 significant at $P < .001$.

Table 2. χ^2 and Odds Ratios for Military- and Nonmilitary-Connected Students^a

Variable	Overall, No. (%)	Connected, %		Odds Ratio (95% CI) ^b
		Military	Nonmilitary	
Lifetime substance use				
Cigarettes	114 287 (16.93)	21.35	16.54	1.53 (1.48-1.58)
Alcohol	266 935 (39.70)	45.22	39.23	1.54 (1.50-1.58)
Marijuana	187 687 (27.92)	32.57	27.52	1.49 (1.45-1.53)
Other drugs	106 049 (15.66)	21.58	15.14	1.60 (1.56-1.65)
Prescription drugs	126 052 (27.36)	35.96	26.68	1.54 (1.49-1.59)
Recent substance use				
Cigarettes	57 468 (8.69)	12.18	8.39	1.59 (1.53-1.66)
Alcohol	144 414 (21.66)	26.47	21.24	1.50 (1.46-1.55)
Marijuana	106 268 (15.94)	19.77	15.60	1.45 (1.40-1.50)
Other drugs	51 494 (7.67)	11.91	7.30	1.73 (1.66-1.80)
Physical violence				
Pushed, slapped, hit, or kicked	179 725 (27.82)	36.40	27.05	1.42 (1.39-1.45)
Fear of being beaten up	117 903 (18.23)	24.41	17.68	1.41 (1.37-1.45)
Been in fight	117 368 (18.21)	27.35	17.38	1.67 (1.62-1.71)
Property damaged	148 902 (23.17)	29.40	22.61	1.37 (1.33-1.40)
Threatened with weapon	51 360 (8.01)	13.76	7.49	1.87 (1.80-1.95)
Seen weapon	157 070 (24.48)	31.90	23.81	1.44 (1.40-1.47)
Nonphysical harassment				
Rumors spread	241 354 (37.45)	43.75	36.89	1.34 (1.31-1.37)
Sexual jokes or gestures	245 736 (21.66)	43.42	37.75	1.32 (1.29-1.35)
Made fun of for looks	230 602 (35.87)	41.46	35.37	1.28 (1.26-1.31)
Cyber harassment	140 056 (22.07)	28.87	21.45	1.54 (1.50-1.58)
Weapon carrying on campus				
Gun	33 838 (5.27)	10.26	4.82	2.20 (2.10-2.30)
Knives and other weapons	60 521 (9.43)	15.45	8.89	1.81 (1.75-1.88)
Any physical violence	344 340 (52.52)	62.51	51.62	1.47 (1.43-1.50)
Any nonphysical harassment	387 905 (59.23)	66.36	58.58	1.42 (1.38-1.45)
Any weapon carrying	68 193 (10.53)	17.68	9.88	1.90 (1.83-1.97)

^a Multivariable logistic regression model adjusted for sex, race/ethnicity, and grade. Percentages presented reflect only participants who responded affirmatively to outcome measures. Results for those who responded negatively are not presented.
^b Confidence interval indicates a statistically significant odds ratio.

odds of military-connected youth reporting cigarette use were 53% greater (OR, 1.53; 95% CI, 1.48-1.58) and the odds of reporting alcohol use were 54% greater (OR, 1.54; 95% CI, 1.50-

1.58) compared with nonmilitary peers. Regarding recent use, among military-connected youth, the odds of reporting cigarette use were 59% greater (OR, 1.59; 95% CI, 1.53-1.66) and the

odds of reporting alcohol use were 50% greater (OR, 1.50; 95% CI, 1.46-1.55) compared with nonmilitary peers.

Violence, harassment, and weapon-carrying ORs associated with military connectedness are presented in Table 2. Among military-connected students, the odds of reporting any physical violence were 47% greater (OR, 1.47; 95% CI, 1.43-1.50) and the odds of reporting any nonphysical harassment were 42% greater (OR, 1.42; 95% CI, 1.38-1.45) compared with nonmilitary peers. Among military-connected students, the odds of reporting weapon carrying were 90% greater (OR, 1.90; 95% CI, 1.83-1.97) when compared with nonmilitary peers.

Regarding possible confounding by SES, the outcome of our correlational analysis was a small, negative correlation suggesting a greater proportion of higher SES students was related to a larger proportion of military-connected youth. Under relatively plausible assumptions specified in eAppendix 2 in the Supplement, our outcomes may be biased by -2.16% to +3.38%. For our lowest OR (1.28) involving the relationship between military connectedness and being made fun of for one's looks, the actual estimate could fall between 1.24 and 1.30. The results of both analyses suggested that SES should not be considered an important confounder in these models.

Discussion

Although increasing attention is being paid to the needs and risks associated with military-connected youth, few studies have examined these issues on a large scale. To our knowledge, the present analyses were the first to assess adverse outcomes related to substance use, violence, harassment, and weapon carrying among military-connected youth using a large, geographically comprehensive, population-based sample. Most military-connected youth in our study appeared to fare relatively well despite exposure to war-related stressors. Sources for such resilience need further exploration in future studies. Nevertheless, our results demonstrated that there is a higher prevalence of substance use, violence, harassment, and weapon carrying among military-connected adolescents during wartime compared with their nonmilitary peers.

Even considering the possible impact of students' age, sex, and race/ethnicity, military-connected adolescents were approximately 50% more likely than their peers to report both recent and lifetime substance use. These results are consistent with previous research suggesting that military connectedness and parental deployment are associated with increases in both internalizing and externalizing behaviors.^{11,14,15,21,22,29} Increased substance use may compound other risk factors and adversely affect school functioning and social/emotional health.^{30,31} Increased rates of prescription medication misuse in this population in particular should be given special consideration by military and civilian physicians.

Military-connected students were also more likely to report both physical and nonphysical violence and harassment than their civilian peers. There is evidence that students who change schools often, as military students do, may be at higher

risk for violence and harassment.^{21,32} Other studies have supported the relationship between family and community stressors and school difficulties, including fighting and violence and harassment, especially as difficulties accumulate and compound one another.^{12,33,34}

Findings regarding the higher prevalence of weapon carrying among military-connected students are also striking. The presence of weapons, particularly guns, in schools presents risks to individual and school safety. Carrying weapons has been linked to both fear and experiencing violence.³⁵ In addition, research reporting increased rates of suicide planning and attempts among military-connected youth¹⁹ highlights the need for concern regarding access to and use of weapons in this population. Higher rates of weapon carrying among military-connected students have also been reported in other parts of the country.¹² One explanation for this disparity may be that having a parent in the military increases access to weapons.^{12,36} Military students, who are known to change schools more often than civilian counterparts,^{32,37} may be more likely to bring weapons to school as a preemptory defense mechanism or in effort to bolster their status among unknown peers.

In 2011, substance use, violence, harassment, and weapon-carrying outcomes were examined using CHKS data from a consortium of 8 districts in San Diego and Riverside counties with a high prevalence of military-connected students.¹¹ When comparing the current statewide data with the 2011 studies, 2 findings emerged. First, overall rates of substance use, violence, harassment, and weapon carrying across the state and rates among nonmilitary-connected students are similar to rates found in 2011. Second, rates of each outcome were noticeably higher among military-connected students in the 2013 statewide data compared with the 2011 San Diego sample. There are several possible explanations for this apparent increase in rates. First, the San Diego area is a region with a high concentration of military installations and thus more resources may be available for this population. If military-connected students across the state are receiving less support than students in San Diego County, this may account for increased adverse outcomes. Further, the data presented here were collected 2 years later than the 2011 San Diego County data. War-related stressors can cumulatively affect adolescent functioning,^{7,38} and 2 additional years of exposure may account for higher rates among students in the 2013 data. This latter possibility is particularly concerning because we may continue to see increases in negative behaviors among military-connected youth, further increasing gaps in functioning between this population and nonmilitary-connected peers.

Despite the large sample, there were limitations to this study. Because the data are cross-sectional, we cannot infer causality. Further, the CHKS is a self-report survey; it is possible that students may have been reluctant to report risky behaviors. However, inaccuracies in reporting are likely to affect military- and nonmilitary-connected youth similarly, potentially leading to an underestimation of the odds of these outcomes among military-connected youth. Additionally, we were unable to control for SES in our analyses because the CHKS did not collect these data. However, our results were similar to those from smaller, regional samples that included a proxy for

SES.^{12,17} Additionally, a sensitivity analysis suggested that SES should not be considered a confounder in our models. Finally, these data were collected across the state of California. Although caution should be taken when generalizing to other regions, results presented here are similar to those found in other parts of the country.^{12,17,22}

Further information specific to military populations (eg, transitions and deployments) was not available in the statewide data and thus is absent from these analyses. These are important variables that have been considered on a smaller scale in previous studies.^{10,11,13} Although findings from studies including these variables echo these results and add validity to our conclusions, future large-scale research should continue to explore the impact of these variables. In particular, deployments have been associated with increased externalizing behaviors.^{11,38} Although we were unable to examine this association in our analyses, it is possible that the increased rates observed among military-connected youth in our sample are attributable to the subset of these youth who have experienced parental deployment.

The findings presented here emphasize the need to assess substance use, experience of violence and harassment, and weapon carrying specifically among military-connected youth. The Military Child Educational Coalition and other organizations have advocated for a military student data identifier to be included in educational records.^{23,39,40} Currently, 14 states have adopted this data element, but the identifier should be adopted nationwide to effectively monitor these and other outcomes.²³ In addition to universal prevention efforts involving enhanced social support and access to resources for military families, targeted interventions, such as Families Overcoming Under Stress⁴¹ or the Military Child Education

Coalition's Student-to-Student program, can be implemented in civilian contexts to better support military-connected youth.^{1,42} Pediatricians and health care professionals in both civilian and military settings are also in a unique position to identify and intervene with military-connected youth who exhibit risky behaviors. Further, ongoing research efforts should consider use of longitudinal designs to determine causality. Smaller qualitative studies informed the current analyses and corroborate the findings presented here.^{43,44} However, larger-scale use of qualitative methods is also warranted to explore nuanced family dynamics, which may account for these outcomes.

Conclusions

Elevated rates of negative behaviors among military-connected youth reflect a larger concern regarding the well-being of military families during this extended period of war. Because the results presented here did not include the impact of deployment, we cannot conclude that deployments and multiple relocations are contributing to elevated rates of risk behaviors. Nonetheless, previous studies regarding the functioning of military-connected youth,^{11,14,15,21} spouses,^{23,45} and service members⁴⁶ have suggested that military families are struggling to cope with wartime stressors, specifically due to deployments, separation, and multiple relocations. Based on the totality of findings from this study and others, further efforts are needed to promote resilience among military children who are struggling. More efforts in social contexts, including civilian schools and communities, to support military families during times of war are likely needed.^{23,42}

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