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Relationship among adverse childhood experiences, history of active military service, and adult outcomes: Homelessness, mental health, and physical health

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Abstract

Objectives: The study aims to answer two questions: Does an individual's report of adverse

childhood experiences predict adult outcomes related to homelessness, mental health, and physical

health? Does an individual's participation in active military service influence the relationship between

childhood and adult adversity?

Methods: Using data from the 2010 Washington State Behavioral Risk Factor Surveillance

System, logistic regressions tested the relationship between adverse childhood experiences and three

adult outcomes—homelessness, mental health, physical health—as well as differences among those

with a history of active military service.

Results: Adverse childhood experiences separately predicted increased odds of experiencing

homelessness as an adult and mental health and physical health problems. Childhood adversity

increased the likelihood of adult homelessness and poor physical health among individuals without a

history of active military service and a greater likelihood of mental health problems among individuals

with a history of active military service.

Conclusions: The relationship between childhood adversity and adult adversity changes in

degree when controlling for a history of active military service, which has implications for Armed Forces

recruitment strategies and post-military service risk assessment.

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Outcomes: Homelessness, Mental Health, and Physical Health

Adult homelessness is a significant public health problem, with nearly 634,000 individuals

experiencing homelessness in the United States on a single night in January 2012 [1]. Individuals

reporting veteran status are overrepresented among the adult homeless population: approximately 13%

(62,619) of adults experiencing homelessness identified as veterans during the January 2012 homeless

point-in-time count, despite representing only an estimated 7.1% of the U.S. population [2]. Other work

estimates that veterans' risk of homelessness is twice that of non-veterans, underscoring possible

differences in the experience of homelessness among veterans and non-veterans [3]. Preventing and

ending homelessness among veterans—as well as among Americans generally—is a national priority [4].

While recent efforts by the U.S. Departments of Housing and Urban Development (HUD) and

Veterans Affairs (VA) appear to be reducing the overall size of the homeless population [1, 5], additional

work is needed to understand the factors that contribute to episodes of homelessness. Adult

homelessness often occurs in a context of other negative life events and problems. A variety of

individual-level factors appear to contribute to, or are correlated with, homelessness, including

disability, mental illness, substance abuse disorders, lack of social or human capital, a history of

institutional involvement, and exogenous health and income shocks [7–24].

Adverse childhood experiences—including abuse, household dysfunction, and neglect—have

been shown to predict a multitude of negative outcomes in adulthood, including mental illness [25–29],

addiction [26–28, 30, 31], and chronic disease [26, 32–34], frequently in the context of population-

representative samples. Meanwhile, the literature linking childhood adversity with adult homelessness

has most frequently focused on individuals experiencing homelessness rather than the general

population. Various types of specific childhood adversities have been associated with adult

homelessness, such as parental substance abuse [35, 36] and childhood abuse and neglect [36–40]. In

addition, a number of studies have identified high rates of adverse childhood experiences among the homeless population [41–48].

There is considerable interest in understanding the shared and distinct contributors to homelessness and related problems among veterans compared to non-veterans, given the elevated rates of homelessness following military service [3]. Debates surround how active service might contribute to, or detract from, an individual's likelihood of poor subsequent outcomes. For example, active service might involve additional stressors related to being removed from support networks (e.g., family and friends) in addition to possible combat exposure. Meanwhile, veteran status also makes available a range of services through the VA that are not provided to non-veterans and military service may act as a "turning point" that benefits many individuals, especially those from at-risk backgrounds [49].

Although previous research has sought to identify specific risk factors for and pathways to homelessness among veterans, sources of risk do not appear to differ significantly for veterans and non-veterans, with the exception of military service during the post-Vietnam era [50, 51]. Several studies looking specifically at the role that childhood adversity—or experiences prior to an individual's entering or leaving active military service—plays in adult homelessness have included a veteran sample or veteran status as a variable in their models [42, 43, 45, 52–57]. A number of these studies assessed the role of specific adversities, such as family instability [57], but did not describe the impact of this experience on adult homelessness. A qualitative study linked childhood abuse and neglect [55] to individuals' decisions to join the military in an effort to escape their family of origin, further linking child abuse and neglect to adult homelessness among this veteran sample.

Past work testing links between adverse childhood experiences and adult homelessness is largely based on cross-sectional retrospective studies using exclusively homeless samples or samples of individuals who all report some sort of childhood adversity. These approaches are limited in their ability

to consider alternative pathways, such as individuals who experience high levels of childhood adversity but not homelessness, or those who report low levels of adversity in childhood but go on to experience homelessness nonetheless. The complexity of the relationship between adverse childhood experiences and adult homelessness, along with the limitations faced by the methods used in the existing literature exploring this relationship, underscores the value of a population-based design that uses probability sampling. This design has only been used in 3 of 29 studies published between 1990 and 2012 that explored the relationship between adverse childhood experiences and homelessness [58–60]; these studies used a limited measure of childhood adversity (i.e., out-of-home placement and living in poverty during first grade). Population-representative approaches allow us to test for links between childhood experience and adult outcomes considering the full range of possible outcomes (e.g., among the homeless and non-homeless) and characteristics (those with and without a history of active military service).

Additional work is needed to determine the role that childhood adversity may play in poor adult outcomes for individuals with a history of active military service, as well as whether military service moderates the relationship between adverse childhood experiences and adult homelessness. Two divergent hypotheses exist: military service may mitigate risk by providing alternative socialization and discipline for otherwise at-risk youth or exacerbate risk by increasing exposure to trauma. The present study considers how experiences of childhood adversity contribute to adult homelessness and related health and mental health problems. We tested the relationship between adverse childhood experiences and outcomes measured in adulthood for the general population of adults in Washington State, then explored possible differences in the adversity-outcome relationship based on individuals' participation in active military service. By using data collected through the Washington State Behavioral Risk Factor Surveillance System (BRFSS), this study addresses a significant limitation in the existing literature: the

BRFSS data are collected from a probability-based sample representative of the general population, as well as subsamples of individuals with a history of active military service.

The present study aims to answer two questions: Does an individual's report of adverse childhood experiences predict adult outcomes related to homelessness, mental health, and physical health? Does an individual's participation in active military service influence the relationship between adverse childhood experiences and adult outcomes related to homelessness, mental health, and physical health?

Methods

This study was approved by the University of Pennsylvania Institutional Review Board.

Data

This study uses data from respondents to the 2010 BRFSS in Washington State. The BRFSS is a state-based health survey coordinated by the Centers for Disease Control and Prevention (CDC) and co-sponsored by the Washington State Department of Health. The BRFSS uses a sample of both land-line and cellular telephone numbers to elicit self-reported health behaviors and preventive health practices from adults. The Washington State Department of Health added questions regarding the primary outcome assessed for this study—adult homelessness—to the BRFSS survey instrument during the final 5 months of data collection; therefore, the study considers only data from the 6,017 respondents to Form A of the 2010 BRFSS. The study team applied weights based on several survey design factors including number of residential telephones in the household, number of adults in the household, geographic stratification, telephone density stratification, and the adult population in each county. Weighting the data minimizes potential bias and maximizes the generalizability of study findings to the population of Washington State.

<u>Measures</u>

The current study used several types of data collected by the BRFSS: demographic factors, scales measuring adverse childhood experiences and psychological distress, history of active military service, and measures of adult homelessness and current physical health. The following describes the variables included in this study.

<u>Demographic Factors.</u> Analyses controlled for participants' gender and age as well as their self-reported racial and ethnic identification.

<u>Adverse Childhood Experiences.</u> In this study, childhood adversity is measured by the participants' responses to 11 questions in the Adverse Childhood Experiences (ACE) Module [31], yielding a computed score (possible range: 0–8). This module asks respondents to recall adverse childhood experiences that occurred before age 18: physical, sexual, or emotional abuse; witnessing violence against a household member; having a household member who is mentally ill, depressed, or suicidal; incarceration of a family member; parental separation or divorce; and having a parent or caregiver who is addicted to drugs. This scale has been used widely in past work, linking childhood adversity to a range of health and mental health outcomes [31, 61]. Although the scale can be used to rank the severity of childhood adversity—0 to 2 ACEs is considered low, 3 to 5 moderate, and 6 to 8 is high—the present study retained the variable as a continuous measure of childhood adversity.

<u>History of Active Military Service.</u> Respondents reported whether they ever served on active duty in the United States Armed Forces. The analyses presented here considered a history of military service to include service in the United States Armed Forces, in the regular military, National Guard, or military reserves. History of military service does not include those whose service was limited to training for Reserves or National Guard.

<u>Adult Homelessness.</u> Respondents were identified as ever experiencing homelessness during adulthood if they indicated that they either (a) lived in a transitional housing program, a hotel or motel

paid by voucher, a domestic violence shelter, an emergency shelter or (b) in a car or other vehicle, abandoned building, or anywhere outside since the age of 18.

Mental Health Problem. The Kessler Psychological Distress Scale (K-6 Scale)—intended to identify individuals who do and do not have serious mental illness—includes six questions about the individual's experience of symptoms of depression and anxiety during the past 30 days. This six-item scale has been validated in past work [62–64], and is commonly used in epidemiological surveys like the BRFSS. A threshold (total score of 13 or greater) was used to indicate individuals with poor mental health. Mental health problems are included as an outcome in this study to confirm whether the relationships found here are consistent with prior research.

Health Problem. Individuals were determined to have a health problem if they reported that in general their health is "fair" or "poor." The response categories for the question are arranged in a 5-point scale from excellent to poor. Health problems are included as an outcome in this study to confirm whether the relationships found here are consistent with prior research.

Statistical Analyses

Analyses involved two sets of logistic regressions that address the research questions guiding the study. First, separate logistic regressions tested the relationship between ACE scores and each of the three outcomes considering all adults, covarying age, sex, and race/ethnicity. To test for differences in these relationships for adults with active military service, we added an interaction term (active military service-by-ACE score) to each model. We then decomposed significant interaction terms to determine the nature of the effect.

Results

Population demographic characteristics and rates of key variables are provided in Table 1. As would be expected in a survey of the general population, a relatively small proportion of individuals experienced adult homelessness (5.5%) or current mental health problems (2.9%); nearly 14% reported

fair or poor health. The average age was 46.2 years (SD = 17.6) and the mean ACE score was 1.7 (SD = 1.9). Roughly one-half of the total population was female, almost 80% identified as White, non-Hispanic.

Of the total sample, approximately 13% reported a history of active military service. Individuals with a history of active military service were approximately 12.5 years older, significantly more likely to be male, and slightly more likely to identify as White/non-Hispanic than those without a history of active military service. These individuals also reported slightly elevated ACE scores (1.8 vs. 1.7) and higher rates of adult homelessness (6.0% vs. 5.5%), mental health problems (3.8% vs. 2.8%), and health problems (17.5% vs 13.1%) compared to individuals who did not report a history of military service.

Adverse Childhood Experiences and Outcomes in the General Population

Separate analyses tested the hypothesized relationship between childhood adversity and three outcomes in the general population: adult homelessness, mental health problems, and health problems. Covarying age, sex, and race/ethnicity, the ACE score separately predicted increased odds of experiencing homelessness as an adult (Exp(B) = 1.62; p < 0.001), increased odds of reporting a mental health problem (Exp(B) = 1.67; p < 0.001), and increased odds of reporting a health problem (Exp(B) = 1.36; p < 0.001). Model coefficients are provided in Table 2. The same general pattern of results emerged in analyses considering unweighted data. (See supplemental materials, Table S1.) Results based on weighted analyses are interpreted below.

In addition, the study team performed post-hoc analyses to test whether these relationships were unique to each outcome; that is, we ran separate models for each outcome, covarying the other two outcomes. The pattern of findings persists and the strength of each effect remains salient, representing 20% to 49% increases above base risk for each one-unit increase in ACE score. (See supplemental materials, Table S2.)

<u>Adverse Childhood Experiences and Outcomes Among Individuals with a History of Active Military Service</u>

A second set of models tested for a moderation effect of a history of active military service on the relationship between ACE score and each outcome. Each of the interaction terms was significant: predicting adult homelessness (Exp(B) = 0.81; $p < 0.001$); mental health problems (Exp(B) = 1.33; $p < 0.001$); and fair or poor health (Exp(B) = 0.95; $p < 0.001$).

Follow-up analyses revealed that higher ACE scores increased the likelihood of homelessness to a greater degree among those without a history of active military service (Exp(B) = 1.67; $p < 0.001$) compared to those with a history of active military service (Exp(B) = 1.42; $p < 0.001$). A similar pattern emerged in the relationship between ACE score and health (no history of military service: Exp(B) = 1.39; $p < 0.001$; history of military service: Exp(B) = 1.22; $p < 0.001$). Conversely, the relationship between ACE score and mental health problems was stronger for those with a history of active military service (Exp(B) = 1.95; $p < 0.001$) relative to those without a history of active military service (Exp(B) = 1.63; $p < 0.001$). See Table 3.

Again, additional post-hoc analyses suggested that these relationships were unique to each outcome. The study team ran separate models for each outcome, covarying the other two outcomes. (See supplemental materials, Table S3.)

Discussion

Adults who reported higher levels of childhood adversity were more likely to also experience adult homelessness, as well as potentially related problems with health and current mental health. Consistent with previous findings [25–34] adverse experiences in childhood appear to place individuals at risk for multiple negative outcomes during adulthood. Using a population-representative sample, the findings reported here confirm the links between adverse childhood experiences and adult

homelessness. Furthermore, this study found that ACE scores uniquely predict homelessness, mental

health problems, and physical health problems, even when accounting for each of the three outcomes.

Childhood adversity also increases the risk for negative adult outcomes among individuals with a

history of active military service. However, the nature of the relationship between childhood and adult

adversity changes in degree when comparing individuals with and without a history of active military

service. While the risk of mental health problems in adulthood appears to be elevated for individuals

with a history of active military service, their risk of adult homelessness and physical health problems is

attenuated relative to those without a history of active military service. Although respondents who

reported a history of active military service reported only slightly higher ACE scores than those without a

history of military service, they did report a greater prevalence of adult homelessness, mental health

problems, and physical problems. Nevertheless, findings indicate that active military service did partially

protect against the negative impact of childhood adversity on adult homelessness and physical health.

This protection may, at least in part, involve the greater access to comprehensive health and social

welfare services that are available to eligible veterans.

In contrast, a history of active military service exacerbated the risk for mental health problems

in adulthood. Other work has suggested that childhood and pre-deployment factors place service men

and women at risk for later poor mental health, especially among veterans who experienced childhood

maltreatment (e.g., physical abuse) and combat exposure [65]. The ACE scores used in the present study

largely index childhood maltreatment; however, the BRFSS does not elicit detailed information about

the nature of military service nor combat exposure. An explanation may be that active military service

increases the likelihood of experiencing other situations (e.g., combat exposure) that uniquely challenge

mental health without adequately addressing these risks through providing protective or compensating

services. Such experiences would especially encourage mental health problems among individuals with

higher ACE scores, given associations between childhood adversity and an individual's ability to adapt to later challenges [66].

The findings from this study have implications across the life span, calling for additional support for children experiencing adversity as well as a recognition of the role that childhood adversity plays in adult functioning. Supporting children and families to reduce their exposure to adversity, and promoting natural protective factors in children's lives that can reduce the deleterious effects of adversity, will likely have positive implications for adult homelessness, health, and mental health [67]. In addition, service providers, researchers, and stakeholders should recognize the links between childhood adversity and adult functioning. This recognition could translate into more effective approaches to service delivery, such as incorporating measures of childhood adversity in screening instruments to assess homelessness risk or identify particular areas of support that individuals may need to prevent episodes of homelessness.

Although this study provides evidence for the relationship between childhood adversity and adult homelessness and related outcomes—as well as an indication that one's history of active military service can convey both protection and risk in terms of adult outcomes—there are some limitations inherent in the data and study design. Although the construct of "history of active military service" may imply an individual's exposure to combat, stressors related to deployment, and access to veterans benefits, the data used for this study do not allow us to control for these in our analyses. The dichotomization of the homelessness variable—ever or never homeless—limits the analysis of respondents' homelessness experiences and does not allow an exploration of the impact of ACEs on chronicity of adult homelessness. In addition, based on the study design, the findings from this study are generalizable to the population of the State of Washington; however, these findings may not be generalizable nationally.

This study highlights the need for future research to understand how involvement in military service may moderate outcomes measured in adulthood or during an individual's post-service period. Specifically, this study indicates that childhood adversity and negative adult outcomes are more prevalent among the population with a history of active military service, but that experience in the military may attenuate the risk for some adult outcomes and exacerbate the risk for others. Additional research should focus on experiences of veterans prior to, during, and following their involvement in military service. By understanding further the risks experienced prior to an individual's entry into military service—as well as the impact of sociodemographic factors such as race and ethnicity—U.S. Armed Forces recruitment strategies could be sensitized to these issues. Further, identifying childhood adversity and other risk factors for homelessness among service members leaving the military would support efforts by the Department of Defense and VA to prevent homelessness. Additional information related to veterans' experience of homelessness in adulthood, such as chronicity of homelessness, would further refine the types of interventions intended to address homelessness among former service members, and further elucidate the pathways to homelessness among military personnel as well as identify points for screening and intervention, particularly around mental health.

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Table 1. Demographic Characteristics and Adult Outcomes, by History of Military Service

Characteristics	Military Service (N=293,707)		No Military Service (N=2,020,281)		Total (N=2,313,988)	
	N	%	N	%	N	%
ACE Score – Mean (SD)	1.8 (2.0)		1.7 (1.8)		1.7 (1.9)	
Age – Mean (SD)	57.3 (17.0)		44.8 (14.1)		46.2 (17.6)	
Sex						
Male	272,353	92.7%	856,019	42.4%	1,128,372	48.8%
Female	21,354	7.3%	1,164,262	57.6%	1,185,616	51.2%
Race/Ethnicity						
White, Non-Hispanic	245,614	83.6%	1,602,272	79.3%	1,847,886	79.9%
Non-White or Hispanic	9,255	3.2%	23,570	1.2%	32,825	1.4%
Other, Non-Hispanic	13,196	4.5%	146,399	7.2%	159,595	6.9%
Multiracial, Non-Hispanic	14,519	4.9%	60,854	3.0%	75,373	3.3%
Hispanic	6,501	2.2%	164,936	8.2%	171,437	7.4%
Adult Homelessness	17,518	6.0%	110,770	5.5%	128,288	5.5%
Mental Health Problem	11,017	3.8%	56,683	2.8%	67,700	2.9%
Health Problem	51,535	17.5%	264,521	13.1%	316,056	13.7%

Note. Percentages may not equal 100% due to missing data. All p-values < 0.001.

Table 2. Logistic Regression Analysis Predicting Outcomes for Adults in the General Population [OR (95% CI)]

	Homelessness	Mental Health Problem	Health Problem
ACE score	1.62 (1.62; 1.63)	1.67 (1.67; 1.68)	1.36 (1.36; 1.36)
Age	1.00 (1.00; 1.00)	1.00 (1.00; 1.01)	1.04 (1.04; 1.04)
Sex [a]	0.78 (0.78; 0.79)	0.95 (0.93; 0.96)	0.92 (0.91; 0.93)
Race/Ethnicity [b]			
Black, Non-Hispanic	2.57 (2.47; 2.68)	4.35 (4.14; 4.56)	1.73 (1.68; 1.78)
Other, Non-Hispanic	1.48 (1.45; 1.51)	0.35 (0.33; 0.37)	1.08 (1.06; 1.10)
Multiracial, Non-Hispanic	2.56 (2.50; 2.61)	1.28 (1.24; 1.32)	1.47 (1.44; 1.50)
Hispanic	0.78 (0.76; 0.80)	1.96 (1.90; 2.01)	2.73 (2.70; 2.77)

Notes. All p-values < 0.001; [a]1 = Male, 2 = Female; [b]Relative to White only, Non-Hispanic group.

Table 3. Logistic Regression Analysis Predicting Outcomes for Adults, by History of Active Military Service [OR (95% CI)]

	Homelessness		Mental Health Problem		Health Problem	
	No Service	Military Service	No Service	Military Service	No Service	Military Service
ACE score	1.69 (1.68; 1.69)	1.42 (1.41; 1.43)	1.63 (1.62; 1.64)	1.95 (1.93; 1.98)	1.39 (1.39; 1.39)	1.22 (1.21; 1.22)
Age	1.00 (1.00; 1.00)	0.99 (0.99; 0.99)	1.01 (1.01; 1.01)	1.00 (1.00; 1.00) *	1.04 (1.04; 1.04)	1.03 (1.03; 1.03)
Sex [b]	0.70 (0.69; 0.71)	1.51 (1.43; 1.58)	0.92 (0.91; 0.94)	1.20 (1.12; 1.29)	0.90 (0.89; 0.90)	0.84 (0.80; 0.87)
Race/Ethnicity [c]						
Black, Non-Hispanic	1.53 (1.44; 1.62)	4.90 (4.60; 5.22)	4.05 (3.84; 4.28)	8.48 (7.62; 9.43)	1.81 (1.74; 1.88)	1.56 (1.47; 1.65)
Other, Non-Hispanic	1.59 (1.55; 1.63)	0.96 (0.90; 1.03) [a]	0.28 (0.26; 0.30)	0.90 (0.81; 1.00) *	1.03 (1.00; 1.05) *	1.41 (1.35; 1.47)
Multiracial, Non-Hispanic	3.28 (3.21; 3.36)	1.01 (0.95; 1.08) [a]	0.54 (0.51; 0.56)	6.08 (5.72; 6.46)	0.86 (0.83; 0.88)	6.60 (6.35; 6.86)
Hispanic	0.77 (0.74; 0.79)	0.69 (0.62; 0.77)	1.94 (1.89; 2.00)	-- [d]	2.78 (2.74; 2.82)	1.25 (1.17; 1.34)

Notes. Unless otherwise noted $p < 0.001$; *$p < 0.05$; [a]$p > 0.05$; [b]1 = Male; 2 = Female; [c]Relative to White only, Non-Hispanic group; [d]Coefficient suppressed due to < 5 unweighted cases with mental health problems.

Supplemental Files

<u>Table S1. Unweighted Logistic Regression Analysis Predicting Outcomes for Adults in the General Population [OR (95% CI)]</u>

	Homelessness	Mental Health Problem	Health Problem
ACE score	1.61 (1.52; 1.70) ***	1.65 (1.53; 1.77) ***	1.28 (1.23; 1.33) ***
Age	0.99 (0.98; 1.00) **	1.00 (0.99; 1.01)	1.03 (1.03; 1.04) ***
Sex[a]	0.60 (0.47; 0.76) ***	0.96 (0.68; 1.35)	0.96 (0.83; 1.11)
Race/Ethnicity[b]			
Black, Non-Hispanic	4.06 (1.92; 8.58) ***	5.28 (2.01; 13.84) **	2.12 (1.22; 3.70) **
Other, Non-Hispanic	1.49 (0.90; 2.47)	1.07 (0.48; 2.37)	1.24 (0.87; 1.75)
Multiracial, Non-Hispanic	2.06 (1.26; 3.38) **	1.57 (0.80; 3.10)	1.99 (1.38; 2.86) ***
Hispanic	1.02 (0.61; 1.72)	2.15 (1.22; 3.79) **	2.32 (1.73; 3.11) ***

<u>Notes</u>. [a]1 = Male, 2 = Female; [b]Relative to White only, Non-Hispanic group; **$p < 0.01$; ***$p < 0.001$.

<u>Table S2. Additional Analyses Testing Unique Associations with Outcomes</u>

	Homelessness	Mental Health Problem	Health Problem
ACE score	1.49 (1.40; 1.58) ***	1.41 (1.30; 1.53) ***	1.20 (1.15; 1.25) ***
Age	0.98 (0.97; 0.99) ***	0.99 (0.98; 1.00) +	1.04 (1.03; 1.04) ***
Sex[a]	0.62 (0.47; 0.78) ***	1.05 (0.73; 1.52)	0.99 (0.85; 1.15)
Race/Ethnicity[b]			
Black, Non-Hispanic	3.51 (1.55; 7.95) **	2.76 (0.92; 8.28) +	1.56 (0.84; 2.89)
Other, Non-Hispanic	1.58 (0.93; 2.68) +	0.94 (0.39; 2.26)	1.15 (0.79; 1.66)
Multiracial, Non-Hispanic	2.04 (1.22; 3.40) **	1.13 (0.54; 2.36)	1.81 (1.23; 2.67) **
Hispanic	0.89 (0.52; 1.52)	1.89 (1.04; 3.46) *	2.25 (1.64; 3.07) ***
Homelessness	--	4.73 (3.16; 7.08) ***	2.40 (1.80; 3.18) ***
Mental Health	4.45 (2.95; 6.71) ***	--	1.20 (1.15; 1.25) ***
Health Problem	2.34 (1.75; 3.11) ***	7.01 (4.86; 10.12) ***	--

<u>Notes</u>. [a]1 = Male, 2 = Female; [b]Relative to White only, Non-Hispanic group; +$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table S3. Additional Analyses Testing Unique Associations with Outcomes by Military Service [OR (95% CI)]

	Homelessness		Mental Health Problem		Health Problem	
	No Service	Military Service	No Service	Military Service	No Service	Military Service
ACE score	1.57 (1.57; 1.58)***	1.38 (1.37; 1.39) ***	1.32 (1.31; 1.32) ***	1.83 (1.81; 1.86) ***	1.32 (1.31; 1.32) ***	1.11 (1.11; 1.12) ***
Age	0.99 (0.99; 0.99)***	0.99 (0.98; 0.99) ***	0.99 (0.99; 0.99) ***	0.99 (0.99; 1.00) ***	1.04 (1.04; 1.04) ***	1.03 (1.03; 1.03) ***
Sex[a]	0.72 (0.71; 0.73)***	1.56 (1.48; 1.64) ***	1.03 (1.01; 1.05) *	1.23 (1.14; 1.33) ***	0.89 (0.88; 0.90) ***	0.79 (0.75; 0.82) ***
Race/Ethnicity[b]						
Black, Non-Hispanic	1.16 (1.09; 1.24)***	4.34 (4.06; 4.63) ***	3.02 (2.84; 3.21) ***	3.87 (3.43; 4.37) ***	1.49 (1.43; 1.56) ***	1.14 (1.07; 1.22) ***
Other, Non-Hispanic	1.88 (1.83; 1.93)***	1.00 (0.93; 1.07)	0.18 (0.17; 0.19) ***	1.09 (0.98; 1.22)	1.08 (1.05; 1.10) ***	1.53 (1.46; 1.61) ***
Multiracial, Non-Hispanic	3.95 (3.85; 4.04)***	0.52 (0.48; 0.55) ***	0.43 (0.41; 0.45) ***	2.70 (2.52; 2.90) ***	0.84 (0.82; 0.87) ***	5.06 (4.85; 5.28) ***
Hispanic	0.65 (0.63; 0.67)***	0.60 (0.53; 0.67) ***	1.67 (1.63; 1.72) ***	--- [c]	2.73 (2.69; 2.77) ***	1.53 (1.43; 1.64) ***
Homelessness	--	--	7.32 (7.16; 7.48) ***	2.04 (1.92; 2.16) ***	1.47 (1.44; 1.49) ***	2.69 (2.59; 2.80) ***
Mental Health	7.21 (7.05; 7.37)***	1.17 (1.09; 1.25) ***	--	--	8.19 (8.03; 8.35) ***	6.58 (6.26; 6.92) ***
Health Problem	1.44 (1.42; 1.47)***	2.85 (2.74; 2.96) ***	8.36 (8.19; 8.52) ***	5.93 (5.61; 6.27) ***	--	--

Notes. +$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; [a]1 = Male, 2 = Female; [b]Relative to White only, Non-Hispanic group; [c]Coefficient suppressed due to < 5 unweighted cases with mental health problems.

As an additional check of the robustness of the findings, we tested hypotheses involving individuals with military service with a limited sample comprised of individuals within the age range of those who had both a history of military service and adult homelessness (28 through 83 years). This ensured that all individuals in the analysis had an opportunity to experience both active military service and adult homelessness. Models tested for a moderation effect of a history of active military service on the relationship between ACE score and each outcome. Each of the interaction terms was significant: predicting adult homelessness (Exp(B) = 0.96; $p < 0.001$); mental health problems (Exp(B) = 1.17; $p < 0.001$); and fair or poor health (Exp(B) = 0.87; $p < 0.001$).

Follow-up analyses revealed that higher ACE scores increased the likelihood of homelessness to a slightly greater degree among those without a history of active military service (Exp(B) = 1.58; $p < 0.001$) compared to those with a history of active military service (Exp(B) = 1.53; $p < 0.001$). A similar pattern emerged in the relationship between ACE score and health (no history of military service: Exp(B) = 1.37; $p < 0.001$; history of military service: Exp(B) = 1.18; $p < 0.001$). Conversely, the relationship between ACE score and mental health problems was stronger for those with a history of active military service (Exp(B) = 1.84; $p < 0.001$) relative to those without a history of active military service (Exp(B) = 1.59; $p < 0.001$). (See Table S4.)

Additional post-hoc analyses suggested that these relationships were unique to each outcome. The study team ran separate models for each outcome, covarying the other two outcomes. (See Table S5.)

Table S4. Logistic Regression Predicting Outcomes by Military Service for Individuals Ages 28 Through 83 [OR (95% CI)]

	Homelessness		Mental Health Problem		Health Problem	
	No Service	Military Service	No Service	Military Service	No Service	Military Service
ACE score	1.58 (1.58; 1.59)	1.53 (1.52; 1.54)	1.59 (1.58; 1.59)	1.84 (1.81; 1.86)	1.37 (1.37; 1.38)	1.18 (1.17; 1.18)
Age	0.98 (0.98; 0.98)	0.97 (0.97; 0.97)	1.01 (1.01; 1.01)	1.00 (1.00; 1.00) [a]	1.03 (1.03; 1.04)	1.03 (1.03; 1.03)
Sex[b]	0.70 (0.70; 0.72)	1.45 (1.38; 1.53)	1.03 (1.01; 1.05)	1.84 (1.71; 1.98)	0.96 (0.95; 0.97)	0.97 (0.93; 1.02) [a]
Race/Ethnicity[c]						
Black, Non-Hispanic	1.52 (1.43; 1.62)	6.58 (6.15; 7.03)	4.92 (4.65; 5.20)	7.45 (6.69; 8.30)	1.92 (1.85; 2.00)	2.28 (2.14; 2.42)
Other, Non-Hispanic	1.49 (1.45; 1.53)	0.69 (0.64; 0.74)	0.41 (0.38; 0.43)	0.86 (0.78; 0.96) **	1.24 (1.22; 1.27)	1.18 (1.13; 1.24)
Multiracial, Non-Hispanic	2.65 (2.58; 2.73)	2.83 (2.67; 2.99)	0.79 (0.75; 0.83)	1.28 (1.15; 1.42)	1.08 (1.05; 1.11)	3.43 (3.28; 3.59)
Hispanic	0.76 (0.74; 0.79)	0.49 (0.44; 0.55)	1.76 (1.70; 1.81)	-- [d]	2.54 (2.50; 2.58)	1.18 (1.17; 1.18)

Notes. Unless otherwise noted, p < 0.001; *p < 0.05; **p < 0.01; [a]not significant; [b]1 = Male, 2 = Female; [c]relative to White only, Non-Hispanic group; [d]coefficient suppressed due to < 5 unweighted cases with mental health problems

Table S5. Logistic Regression Predicting Unique Outcomes by Military Service for Individuals Ages 28 Through 83

	Homelessness		Mental Health Problem		Health Problem	
	No Service	Military Service	No Service	Military Service	No Service	Military Service
ACE score	1.46 (1.45; 1.46)	1.46 (1.44; 1.47)	1.31 (1.30; 1.31)	1.70 (1.67; 1.72)	1.30 (1.29; 1.30)	1.10 (1.09; 1.11)
Age	0.98 (0.98; 0.98)	0.96 (0.96; 0.97)	1.00 (1.00; 1.00)	1.00 (1.00; 1.00) [a]	1.04 (1.03; 1.04)	1.03 (1.03; 1.04)
Sex[b]	0.72 (0.71; 0.73)	1.34 (1.27; 1.42)	1.13 (1.11; 1.15)	1.76 (1.63; 1.90)	0.94 (0.93; 0.95)	0.88 (0.84; 0.93)
Race/Ethnicity[c]						
Black, Non-Hispanic	1.18 (1.11; 1.26)	5.26 (4.88; 5.67)	3.59 (3.37; 3.82)	3.22 (2.86; 3.63)	1.51 (1.44; 1.58)	1.64 (1.54; 1.75)
Other, Non-Hispanic	1.58 (1.54; 1.63)	0.71 (0.66; 0.77)	0.25 (0.24; 0.27)	1.10 (0.99; 1.23) +	1.25 (1.22; 1.27)	1.25 (1.19; 1.32)
Multiracial, Non-Hispanic	2.96 (2.88; 3.05)	2.22 (2.09; 2.36)	0.75 (0.71; 0.79)	0.69 (0.61; 0.77)	1.05 (1.03; 1.08)	3.14 (3.00; 3.29)
Hispanic	0.66 (0.64; 0.68)	0.44 (0.40; 0.50)	1.52 (1.47; 1.57)	--- [d]	2.46 (2.42; 2.51)	1.48 (1.38; 1.59)
Homelessness	--	--	4.91 (4.79; 5.03)	3.70 (3.46; 3.95)	2.01 (1.98; 2.05)	3.10 (2.99; 3.22)
Mental Health	4.91 (4.79; 5.03)	3.36 (3.14; 3.59)	--	--	8.57 (8.38; 8.76)	3.12 (2.95; 3.31)
Health Problem	1.97 (1.93; 2.00)	3.28 (3.16; 3.41)	8.50 (8.32; 8.69)	3.09 (2.90; 3.28)	--	--

Notes. Unless otherwise noted, $p < 0.001$; *$p < 0.05$; **$p < 0.01$; [a]not significant; [b]1 = Male, 2 = Female; [c]relative to White only, Non-Hispanic group; [d]coefficient suppressed due to < 5 unweighted cases with mental health problems