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Association between Exposure to Combat-Related Stress and Psychological Health in Aging Men: The Atherosclerosis Risk in Communities (ARIC) Study

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Abstract

Exposure to military combat has been associated with myriad adverse health effects. The mechanisms linking these two events are not well understood but may include negative emotional states, such as anger and vital exhaustion. We investigated the relationship between combat status and psychological functioning (trait anger and vital exhaustion) among middle-aged men (N=5,347) who participated in the Life Course Socioeconomic Status, Social Context and Cardiovascular Disease Study, an ancillary study to the Atherosclerosis Risk in Communities (ARIC) Study. Combat status was significantly associated with trait anger, although results were limited to men (combat veterans compared to non-combat veterans and combat and non-combat veterans compared to non-veterans) of the Korean and Vietnam War eras. Non-combat veterans from the World War II and Vietnam War eras reported lower vital exhaustion compared to non-veterans. Combat status is significantly associated with trait anger among men of the Korean and Vietnam War eras. Anger proneness may be a mechanism through which combat stress is associated with adverse health outcomes.

Keywords

anger; depression; epidemiology; war; veterans

According to the 2000 census, military service is common to approximately 26 million adults in the United States (United States Census Bureau, 2000). Many of these men and women are war veterans who served overseas in combat zones. The adverse health effects, both physical and psychological, of military combat are well-documented. Posttraumatic stress disorder (PTSD), depression, and anxiety are common psychological expressions of the ill effects of war (Green, Wilson, & Lindy, 1985). There is also some indication that these effects can be long-lasting, affecting well-being and adjustment across the life span (Elder & Clipp, 1989). In addition to adverse psychological consequences, combat experience has been associated with several negative physical effects, such as decline in

physical functioning and death in the 15-year postwar interval (Elder, Shanahan, & Clipp, 1997), increased self-reported physical ailments (Wagner, Wolfe, Rotnitsky, Proctor, & Erickson, 2000), coronary heart disease (CHD) and CHD mortality (Kubzansky, Koenen, Jones, & Eaton, 2007; Boscarino, 2008), autoimmune diseases, diabetes mellitus, thyroid disease (Boscarino 2004), circulatory, digestive, musculoskeletal, respiratory and nervous system disorders (Boscarino 1997), and increased physician-diagnosed medical disorders of several bodily systems (Schnurr, Spiro, & Paris, 2000).

The pathways linking psychosocial stress, in general, to negative health outcomes are not well understood; those linking combat stress, in particular, are understood even less. A recent investigation implicates a behavioral mechanism, most notably heavy alcohol use (Elder, Clipp, Brown, Martin, & Friedman, 2009). If we conceptualize the experience of combat stress to include a host of negative affective states, then an examination of trait anger and vital exhaustion may provide some valuable insights - particularly in view of previous reports of increased anger/hostility among combat veterans (Chemtob, Hamada, Roitblat, & Muraoka, 1994; Glenn et al., 2002) and a positive association of anger to PTSD (Orth & Wieland, 2006). Moreover, negative affective states tend to cluster; thus, it would not be unusual for anger, vital exhaustion, PTSD, anxiety, and depression to coexist in veterans who have experienced military combat.

Trait anger is an emotional state defined as the degree to which a person experiences anger ranging from mild irritation to full-blown rage (Spielberger, Jacobs, Russell, Crane, 1983). Vital exhaustion, sometimes considered the end stage of psychosocial stress, is a state characterized by unusual tiredness and lack of energy, irritability, and demoralization (Appels, Hoppener, & Mulder, 1987). Vital exhaustion is akin to depression as they have some overlapping symptoms, most notably fatigue and irritability. With respect to disease outcomes, anger and vital exhaustion have been examined most frequently for their association with incident cardiovascular disease (CVD), including both CHD (Chang, Ford, Meoni, Wang, & Klag, 2002; Prescott et al., 2003) and stroke (Williams, Nieto, Sanford, Couper, & Tyroler, 2002; Schuitemaker, Dinant, Van Der Pol, Verhelst, & Appels, 2004). As well, anger has been associated with the occurrence and progression of atherosclerosis, the underlying vascular disorder in CVD (Bleil, McCaffery, Muldoon, Sutton-Tyrrell, & Manuck, 2004; Räikkönen, Matthews, Sutton-Tyrrell, & Kuller, 2004). It is important to note that the positive associations of anger and vital exhaustion with deleterious health behaviors (Siegler, Costa, Brummett, Helms, Barefoot, Williams, et al., 2003) and immune-mediated inflammation (Suarez, Lewis, Krishnan, Young, 2004; von Kanel, Frey, & Fischer, 2004) may serve to link these psychological states to other disease outcomes as well.

The purpose of this analysis was to investigate the relationship between combat status and psychological functioning among middle-aged men and to determine whether this association varied by war era. We hypothesized that men who were exposed to military combat would have higher levels of trait anger and higher levels of vital exhaustion when compared to their non-combat- and non-veteran peers.

METHODS

Study population

Participants were 5,347 men, aged 57 to 79 years, enrolled in the LC-SES Study. The LC-SES Study, begun in 2001, is an ancillary study to the ARIC Study (The ARIC Investigators, 1989). The ARIC Study is a long-term, prospective cohort study designed to assess the natural history of CVD and atherosclerosis. ARIC participants were drawn from four US communities: suburban Minneapolis, MN, Washington County, MD, Forsyth County, NC, and Jackson, MS. African-Americans were sampled exclusively in Jackson and sampled proportionately in Forsyth to ensure race-specific estimates. The Minnesota and Washington County sites were predominantly white. Response rates were 46% in Jackson and 65–67% in the other sites. A comparison of respondents to non-respondents and details about the study and procedures are published (The ARIC Investigators, 1989).

The LC-SES Study was designed to investigate the association between SES across the lifespan and cardiovascular-related outcomes. The LC-SES Study includes 81% of participants from the ARIC baseline examination (1987–1989). The current analysis is limited to men, as only 48 of the ARIC female participants reported prior service in the military, and of them only 5 reported exposure to combat. From a total of 7,030 men - which excludes those who reported a racial/ethnic identity that was neither black nor white and blacks who were from suburban Minneapolis, MN or Washington County, MD - we further excluded those who did not participate in the LC-SES Study and those with missing or unknown information on military exposure status, leaving a sample size of 5,347. From this total, we excluded men who could not be assigned to the World War II, Korean or Vietnam War era. Thus, our final sample size was 4,620, including 987 blacks and 3,633 whites.

Assessment of Combat Status

Information about combat status was obtained as part of the LC-SES telephone survey, which consisted of a battery of questions regarding parental and childhood occupational, educational and residential exposures, and military service. Participants were asked whether they had served in the military. If the response was affirmative, they were asked seven additional questions to determine various aspects of their tour of duty. These included: 1) age at entry into the military, 2) duration of service, 3) overseas service, 4) service in a combat zone, and whether they 5) were ever under fire or fired at the enemy, 6) saw others wounded or killed, or 7) were ever wounded or missing in action. This information was used to derive a 3-level exposure variable: no history of military service (non-veteran), history of military service without exposure to combat stress (non-combat veteran), and history of military service with exposure to one or more combat experiences (combat veteran). Responses to questions 4–7 were used to classify veterans by combat-non-combat status. This measure of combat status is similar to that used in previous studies (Axelrod, Morgan, & Southwick, 2005; Hoge et al., 2004), in which acceptable reliability ($Kappa=0.84$) and validity have been reported (Janes, Goldberg, Eisen, & True, 1991). Era of service was determined by combining age at entry and duration of service to categorize into World War II (1941–1945), Korean War (1950–1953) and Vietnam War (1961–1975) eras. Non-veterans

were matched to these groups by age at the ARIC baseline examination (60+, 52–59, and <52, respectively).

Psychological Assessments

Psychological assessments were obtained at Visit 2 (1990–1992). Trait anger was assessed by the Spielberger Trait Anger Scale (Spielberger, Jacobs, Russell, & Crane, 1983). This is a Likert-type scale that assesses a person's typical experience with anger: Almost Never = 1, Sometimes = 2, Often = 3, and Almost Always = 4. Responses to each of the items were summed to yield an overall score. Published internal consistency reliability coefficients for the Spielberger Scale range from 0.81 to 0.92 (Spielberger, Jacobs, Russell, & Crane, 1983). The Spielberger Scale correlates positively with other widely used measures of anger/hostility, such as the Buss-Durkee Hostility Inventory ($r = 0.66$ to 0.73) and the Cook-Medley Hostility Scale ($r = 0.43$ to 0.59) (Spielberger, Jacobs, Russell, & Crane, 1983). The Spielberger Trait Anger Scale comprises two subscales – anger temperament and anger reaction. Anger temperament is defined as the predisposition toward quick, unprovoked (or minimally provoked) anger, and anger reaction as anger aroused in response to frustration, criticism, or unfair treatment. Each subscale comprises four items, which were summed to yield an overall score. Reported internal consistency reliability coefficients range from 0.84 to 0.89 and from 0.70 to 0.75 for the anger temperament and anger reaction subscales, respectively (Spielberger, Jacobs, Russell, & Crane, 1983).

Vital exhaustion was defined as excessive fatigue, feelings of demoralization, and increased irritability and was assessed using the 21-item Maastricht Questionnaire (Appels, Hoppener, & Mulder, 1987). The response categories for the individual items were: Yes = 2; Don't know = 1; No = 0. Questions 9 and 14 were reversed coded (Yes = 0; Don't know = 1; No = 2). Overall exhaustion scores ranged from 0 – 42. Adequate internal consistency (Cronbach's $\alpha = 0.89$) has been reported (Appels, Hoppener, & Mulder, 1987). In addition to the overall vital exhaustion scale, the vegetative and the non-vegetative depressive symptoms subscales were used (Golden et al., 2004). The vegetative depressive symptoms subscale consists of 8 items and assesses fatigue and exhaustion, sleep pattern, and cognitive processing. The non-vegetative depressive symptoms subscale consists of 10 items and assesses hopelessness, irritability, demoralization, enjoyment of sex, and suicidal ideation.

Assessment of CVD Risk Factors

A detailed description of the clinical and laboratory measurements assessed in the ARIC study has been previously published (The ARIC Investigators, 1989). In brief, a trained technician obtained blood pressures with a sphygmomanometer after the participants had been seated and resting for five minutes. The average of the second and third of three brachial measurements were used to define hypertension (defined as diastolic blood pressure ≥ 90 mmHg, or systolic blood pressure ≥ 140 mmHg, or use of one or more antihypertensive medications within the past two weeks). Diabetes was defined as a fasting serum glucose level ≥ 126 mg/dL, a non-fasting serum glucose level ≥ 200 mg/dL (hexokinase method) and/or a history of diabetes, insulin therapy, or oral hypoglycemic medication use within the past two weeks. Data for these variables were also obtained at Visit 2.

Statistical Analyses

Means and standard deviations or frequencies and percentages were used to describe differences in sociodemographic and cardiovascular risk factor characteristics among combat veterans, non-combat veterans, and non-veterans in each war era. Means and standard deviations were used to describe differences in trait anger and vital exhaustion among sociodemographic and cardiovascular risk factor characteristics. Differences in proportions for categorical variables were assessed using chi-squared tests. Differences in means for continuous variables were assessed using one-way analyses of variance or t-tests. The association between combat status and trait anger or vital exhaustion was determined by regression analysis in two ways. First, trait anger and vital exhaustion were used as dependent variables in separate multiple linear regression models. Three comparisons were made: combat veterans vs. a non-combat veteran referent; combat veterans vs. a non-veteran referent; and non-combat veterans vs. a non-veteran referent. We assessed heterogeneity of associations by war era for each of the comparisons. When trait anger was examined, effect modification was observed for the non-combat- versus non-veteran ($p = 0.02$) and combat-versus non-combat veteran ($p = 0.07$) comparisons. None of the interaction terms was statistically significant when effect modification by war era was examined using vital exhaustion. Multiple linear regression models were stratified by era of service, adjusted for adult educational level, race/ethnicity, and for veterans, age upon entry into military service and duration of service. Linear regression models were used to generate adjusted means of overall and component trait anger and vital exhaustion scores. The trait anger subscale components were angry temperament and angry reaction; for vital exhaustion, they were vegetative- and non-vegetative depressive symptoms.

We also used trait anger and vital exhaustion as dependent variables in logistic models to estimate odds ratios (ORs) and 95% confidence intervals (CIs). The two-level trait anger variable was derived by categorizing scores into low (10–21) and high (22–40) subgroups (Williams et al., 2000). Similarly, the two-level vital exhaustion variable was derived by dividing scores into low (0–18) and high (19–42) subgroups (Appels, Falger, & Schouten, 1993).

When we assessed for effect modification of the associations between military/combat status and two-level trait anger and vital exhaustion variables by war era there were no significant interactions; thus, in subsequent analyses war era was entered into models as a covariate. Additional covariates were: adult educational level, race/ethnicity, age upon entry into military service, and duration of service.

RESULTS

Participant Characteristics

Characteristics of the study population stratified by war era and combat status are presented in Table 1. There were significant differences in age, race/ethnicity, and educational level among men in each war era. Most notably, non-veterans of all three war eras were less likely to be white and to have a high school education than were combat and non-combat veterans. Non-veterans also had the fewest mean pack years of cigarette smoking than did combat and

non-combat veterans; however, this difference was only significant among men of the Korean War era. Among Korean and Vietnam War era veterans, non-veterans had a higher prevalence of hypertension than did combat- and non-combat veterans. The prevalence of diabetes was greater among combat veterans of the Korean War era and greater among non-veterans of the World War II and Vietnam War eras.

Sociodemographic and health status characteristics by trait anger and vital exhaustion are presented in Table 2. Higher trait anger scores were observed among white participants and current smokers. Higher vital exhaustion scores were observed among black participants, those with a less than high school education, current smokers, hypertensives, and diabetics.

Results from Linear Regression Models

Multiple linear regression models were run to examine the association between trait anger and combat/veteran status by war era. In men of the Korean War era, overall trait anger was significantly associated with combat status when combat ($P < 0.0001$) and non-combat ($P = 0.006$) veterans were compared to non-veterans (Table 3). Mean overall trait anger scores were significantly higher among combat veterans and non-combat veterans compared to non-veterans. In regression analyses of the trait anger subscales (data not shown), anger temperament was significantly associated with combat status when combat veterans were compared to non-combat veterans ($P = 0.008$) and non-veterans ($P = 0.0001$). Anger temperament scores were significantly higher among combat veterans compared to non-combat veterans and non-veterans (data not shown). The anger reaction subscale was also significantly associated with combat status when combat veterans ($P = 0.004$) and non-combat veterans ($P = 0.005$) were compared to non-veterans. Significantly higher anger reaction scores were observed among combat veterans and non-combat veterans compared to non-veterans.

In men of the Vietnam War era, overall trait anger was significantly associated with combat status when combat veterans were compared to non-combat- ($P = 0.02$) and non-veterans ($P = 0.004$) (Table 3). Combat veterans had significantly higher overall trait anger scores compared to non-combat veterans. Higher trait anger scores were also observed among combat veterans compared to non-veterans. Similar results were obtained when anger temperament was examined in regression analysis ($P = 0.05$ and $P = 0.009$ for combat vs. non-combat veterans and combat vs. non-veterans, respectively) (data not shown). Accordingly, anger temperament scores were significantly higher among combat veterans compared to non-combat veterans and higher among combat veterans compared to non-veterans. Anger reaction was significantly associated with combat status when combat veterans were compared with their non-veteran counterparts ($P = 0.03$). Combat veterans had higher anger reaction scores than non-veterans.

No statistically significant associations were found between overall trait anger or its subscales and combat status in men of the World War II era.

In multiple linear regression analyses examining the association between vital exhaustion and combat/veteran status by war era, vital exhaustion was significantly associated with combat status among men of the World War II and Vietnam War eras when non-combat

veterans were compared to their non-veteran peers ($P = 0.05$ and $P = 0.03$, respectively) (Table 4). For men of the World War II and Vietnam War eras, lower vital exhaustion scores were observed among non-combat veterans compared to non-veterans. The vegetative depressive symptoms subscale was significantly associated with combat status among men of the Vietnam War era ($P = 0.01$) (data not shown). Again, significantly lower vegetative depressive symptom scores were observed among non-combat veterans [mean (s.e.) = 3.5 (0.18)] compared to their non-veteran [4.1 (0.12)] counterparts. No statistically significant associations were observed between overall vital exhaustion or its subscales and combat-related stress in men of the Korean War era.

Results from Logistic Regression Models

Overall, 7.7% of participants scored in the high trait anger range as previously defined (Williams et al., 2000). The proportions scoring in the high anger range were 6.8%, 7.7%, and 9.3% for non-veterans, non-combat veterans, and combat veterans, respectively. The aggregate proportion of participants who scored in the high vital exhaustion range was 10.7%. The proportions by combat status were 11.8%, 9.7%, and 10.8% for non-veterans, non-combat veterans, and combat veterans, respectively. In multivariate logistic regression analyses using the dichotomized trait anger and vital exhaustion variables (high versus low), the results showed that, compared to non-veterans, combat veterans were 47% more likely to have high anger (OR = 1.47, 95% CI: 1.10–2.00) (Table 5). No statistically significant associations were found between combat status and the risk for vital exhaustion.

DISCUSSION

These results demonstrated significant positive associations between trait anger and exposure to combat among veterans of the Korean and Vietnam War eras. Specifically, among men of the Korean War era, combat- and non-combat veterans, compared to their non-veteran counterparts, reported more trait anger, including more palpable anger and anger experienced in reaction to frustration, criticism, or unfair treatment. Sociodemographically, combat- and non-combat veterans were more likely to be white with a high school educational level or above. A profile of vascular risk factors indicated that they smoked more cigarettes and were more likely to be diabetic than their non-veteran peers. Combat veterans of the Vietnam War era reported more anger than their non-combat- and non-veteran counterparts. They more likely to be white with a high school educational level or above compared to non-veterans. Combat status was not significantly associated with overall trait anger, anger temperament, or anger reaction in men of the World War II era. Overall vital exhaustion was significantly lower among non-combat veterans compared to non-veterans of the World War II and Vietnam War eras.

The association between combat status and trait anger varied according to war era with stronger effects being observed in men of the Korean and Vietnam War eras. This may be due to differences in the nature of the conflicts and how they were resolved, differences in the degree of public support for the war, and differences in veterans' homecoming experiences (Elder & Clipp, 1989; McCranie & Hyer, 2000). There was more public support for World War II compared to that for the Korean or Vietnam conflicts. Unlike World War II,

victory in the Korean and Vietnam wars was not decisive, but rather a negotiated settlement between warring factions. Further, in Vietnam, the combat was fiercer, more protracted, and the exposure to atrocities was greater than in World War II. Also, unlike returning World War II veterans, veterans of the Korean and Vietnam conflicts were not well received upon their homecoming, owing to a public perception of military incompetence and failure of US foreign policy.

Differences in veterans' military and postwar experiences may have engendered persistent disparities in their psychological functioning. Indeed, studies report that, compared to veterans of World War II, Vietnam War era veterans have more psychological distress, including more severe post-traumatic stress disorder (PTSD), increased vulnerability to psychosis, greater survivor guilt, greater predisposition to suicide, as well as elevated levels of anxiety, hostility, and depression (Davidson, Kudler, Saunders, & Smith, 1990). Similarly, Korean War era veterans have been shown to have more severe PTSD than World War II era veterans (McCranie & Hyer, 2000). In Australia, investigators observed that, compared to non-veterans, veterans of the Korean War were at substantially increased risk for PTSD, anxiety, and depression 50 years later (Ikin et al., 2007).

This analysis has several key strengths. In contrast to most studies of this topic, the ARIC Study includes men from birth cohorts with military service in World War II, the Korean and Vietnam wars. Also, our study also includes a population-based, comparison group of non-veterans. Further, ARIC included data from widely used psychological instruments that have acceptable psychometric properties, and those data were included in our analysis. The time from military discharge to the ascertainment of psychological data was 35 years on average, thereby permitting an assessment of variations in trait anger and vital exhaustion by combat status.

There are possible limitations that are noteworthy as well. One is the use of a self-reported measure of combat status, which carries the potential for inaccuracies and recall biases. Another is the potential for survivorship bias since military service data were ascertained fifteen years after the assessment of the psychological data. Approximately 22% of African-American and 13% of white participants died before the LC-SES ancillary study was begun. Additionally, lost to follow-up might have been most likely among World War II veterans since they were eldest among the cohort participants. Thus, it is possible that selective survival may have biased our findings. It was reassuring, however, that in a study on a subset of ARIC decedents who died prior to the LC-SES Study, for whom veteran status was obtained from death certificates, there was no significant excess mortality among veterans, even after adjustment for age, race/ethnicity, and educational level. We also assessed whether the psychological measurements were associated with differential survival. We found that trait anger and vital exhaustion were significantly higher among men who did not participate in the LC-SES ancillary study. The effect of differential survival on our results, if any, is likely to be a bias toward the null hypothesis. Another potential limitation of this analysis is its cross-sectional nature, which carries inherent temporal ambiguity and precludes any certainty of whether combat-related stress preceded high levels of anger or vice versa.

In conclusion, findings from this analysis add to the existing body of knowledge regarding the psychological and emotional functioning of men who have experienced military combat. They may contribute a greater understanding of the psychological mechanisms that mediate combat-related stress and adverse health outcomes.

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Table 1
Distribution of male LC-SES study participants at second ARIC clinic examination (1990–1992), by combat status

	Combat veterans	Non-combat veterans	Non veterans	p-value	Overall
Participants, N (%)					4620
World War II	478 (47.4)	314 (31.1)	217 (21.5)		
Korean War	407 (22.9)	675 (38.0)	695 (39.1)		
Vietnam War	198 (10.8)	506 (27.6)	1130 (61.6)		
Age in years, mean (s.d.)					57.0 (5.9)
World War II	65.4 (1.4)	64.3 (1.5)	64.8 (1.6)	<.0001	
Korean War	59.6 (2.2)	59.2 (2.4)	57.8 (2.4)	<.0001	
Vietnam War	50.5 (2.7)	51.1 (2.5)	50.9 (2.0)	.003	
% White					78.6
World War II	90.6	88.2	68.7	<.0001	
Korean War	85.3	87.0	70.6	<.0001	
Vietnam War	80.3	85.2	67.2	<.0001	
< High school education, (%)					21.8
World War II	23.4	24.5	52.3	<.0001 *	
Korean War	16.5	13.9	40.4	<.0001 *	
Vietnam War	4.1	4.0	20.6	<.0001 *	
Cigarette smoking (pack-years), mean (s.d.)					20.7 (23.6)
World War II	26.2 (26.3)	23.0 (24.4)	22.8 (28.7)	.16	
Korean War	25.9 (26.9)	22.9 (23.8)	20.6 (25.5)	.006	
Vietnam War	17.6 (19.3)	17.6 (20.7)	15.7 (18.9)	.17	
Waist-to-hip ratio, mean (s.d.)					0.965 (0.054)
World War II	.973 (.049)	.969 (.050)	.967 (.052)	.33	
Korean War	.969 (.057)	.969 (.054)	.967 (.053)	.72	
Vietnam War	.963 (.057)	.956 (.056)	.959 (.054)	.31	
Hypertensive, (%)					34.3
World War II	40.5	43.5	42.2	.70	
Korean War	36.9	34.1	38.3	.27	
Vietnam War	24.5	23.3	30.9	.005	

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	Combat veterans	Non-combat veterans	Non veterans	p-value	Overall
Diabetic, (%)					14.4
World War II	17.5	14.6	21.4	.14	
Korean War	18.4	13.3	12.6	.02	
Vietnam War	10.6	11.2	14.2	.16	

* Three-level comparison (< high school, high school, and high school)

Table 2

Distribution of sociodemographic and cardiovascular risk factor characteristics at second ARIC clinic examination (1990–1992), by trait anger and vital exhaustion

	Trait anger	Vital exhaustion
	Mean (s.d.)	Mean (s.d.)
Race	P < 0.0001	P = 0.003
White	16.4 (3.8)	7.6 (7.5)
Black	15.3 (3.7)	8.5 (7.8)
Education	P = 0.36	P < 0.0001
< High school	16.2 (4.4)	10.1 (8.4)
High school	16.3 (3.7)	8.1 (7.6)
> High school	16.1 (3.6)	6.5 (6.8)
Cigarette status	P < 0.0001	P < 0.0001
Current	16.7 (3.8)	9.1 (8.2)
Former	16.4 (3.9)	7.6 (7.5)
Never	15.4 (3.4)	7.1 (7.1)
Hypertensive	P = 0.61	P < 0.0001
Yes	16.2 (3.9)	8.6 (8.0)
No	16.2 (3.7)	7.4 (7.3)
Diabetic	P = 0.41	P < 0.0001
Yes	16.3 (3.8)	9.2 (8.4)
No	16.2 (3.8)	7.5 (7.4)

Table 3

Least square means (standard errors) for trait anger among male LC-SES participants at the second ARIC clinic examination (1990–1992)

Combat Status	World War II Era		Korean War Era		Vietnam War Era	
	Mean (s.e.)	Difference between means (95% C.I.)	Mean (s.e.)	Difference between means (95% C.I.)	Mean (s.e.)	Difference between means (95% C.I.)
Combat veteran ¹	16.27 (0.17)	0.33 (−0.21, 0.88)	16.62 (0.19)	0.35 (−0.13, 0.83)	17.14 (0.29)	0.81 (0.13, 1.49) P = 0.02
Non-combat veteran ¹	15.94 (0.22)		16.27 (0.15)		16.33 (0.18)	
Combat veteran ²	16.27 (0.18)	0.43 (−0.22, 1.09)	16.66 (0.19)	1.01 (0.53, 1.49) P < 0.0001	17.12 (0.28)	0.89 (0.29, 1.49) P = 0.004
Non-veteran ²	15.84 (0.28)		15.65 (0.15)		16.22 (0.12)	
Non combat veteran ²	15.89 (0.22)	0.05 (−0.64, 0.75)	16.24 (0.15)	0.59 (0.17, 1.01) P = 0.006	16.27 (0.18)	0.05 (−0.37, 0.47)
Non veteran ²	15.84 (0.28)		15.65 (0.15)		16.22 (0.12)	

¹ Adjusted for education, race/ethnicity, age upon entry into military service, duration of service

² Adjusted for education, race/ethnicity

Least square means (standard errors) for vital exhaustion among male LC-SES participants at the second ARIC clinic examination (1990–1992)

Table 4

Combat Status	World War II Era		Korean War Era		Vietnam War Era	
	Mean (s.e.)	Difference between means 95% C.I.	Mean (s.e.)	Difference between means (95% C.I.)	Mean (s.e.)	Difference between means (95% C.I.)
Combat veteran ¹	8.33 (0.34)	0.31 (−0.76, 1.37)	7.72 (0.37)	0.44 (−0.48, 1.35)	7.15 (0.55)	0.48 (−0.80, 1.77)
Non-combat veteran ¹	8.02 (0.42)		7.28 (0.28)		6.66 (0.34)	
Combat veteran ²	8.41 (0.35)	−1.25 (−2.55, 0.06)	8.00 (0.37)	0.90 (−0.03, 1.83)	7.51 (0.57)	−0.43 (−1.65, 0.78)
Non-veteran ²	9.65 (0.55)		7.10 (0.29)		7.94 (0.24)	
Non combat veteran ²	8.24 (0.43)	−1.41 (−2.80, −0.02)P = 0.05	8.01 (0.37)	0.46 (−0.35, 1.27)	6.99 (0.35)	−0.95 (−1.80, −0.11)P = 0.03
Non veteran ²	9.65 (0.55)		7.55 (0.23)		7.94 (0.24)	

¹ Adjusted for education, race/ethnicity, age upon entry into military service, duration of service

² Adjusted for education, race/ethnicity

Table 5

Odds of having high trait anger and high vital exhaustion. Odds ratios (95% confidence intervals) among male LC-SES participants at the second ARIC clinic examination (1990–1992)

Combat Status	Odds Ratio (95% C.I.)	
	Trait Anger	Vital Exhaustion
Combat Veteran ¹	1.11 (0.82 – 1.49)	1.00 (0.74 – 1.34)
Non Combat Veteran (referent)	1.00	1.00
Non Combat Veteran ²	1.26 (0.96 – 1.64)	0.97 (0.75 – 1.24)
Non Veteran (referent)	1.00	1.00
Combat Veteran ²	1.47 (1.10 – 2.00)	0.94 (0.71 – 1.25)
Non Veteran (referent)	1.00	1.00

¹ Adjusted for education, race/ethnicity, age upon entry into military service, duration of service, war era

² Adjusted for education, race/ethnicity, war era