When War Comes Home:
The Effect of Combat Service on Domestic Violence[*]

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Abstract

This study is the first to estimate the effect of combat exposure on domestic violence. We exploit a natural experiment in overseas deployment assignment among active duty servicemen in the Global War on Terrorism (GWOT) and find that servicemen exogenously exposed to combat are substantially more likely to physically assault their intimate partners and children. These findings are robust to controls for propensity for violence prior to deployment and can be explained, in part, by the stress- and substance use-related consequences of war.

1. Introduction

Between 2.5 and nearly 5.0 million physical assaults per year are perpetrated against women by their intimate partners (Rand and Rennison 2005). Card and Dahl (2011) describe two theoretical explanations for why men might commit acts of violence against their intimate partners or other family members: (i) men use violence as a mechanism to control their partners (or children), and (ii) violence arises unintentionally via the interaction of verbal arguments with stress and emotional cues. This second explanation raises concerns that stress may be an important contributing factor to incidents of domestic violence.

Because of the substantial occupational stress that accompanies military service, the families of servicemen have been identified by policymakers as a vulnerable population in need of protection from such violence. The Department of Defense (DOD) has taken a strong position against domestic violence beginning with the implementation of DOD Directive 6400.1 in 1981, when it set out administrative procedures through which suspected incidents of abuse would be dealt. Specifically, this directive:

> …required each branch of military service to establish (a) a Family Advocacy Program to prevent child maltreatment and spouse abuse; and (b) a confidential registry to collect and analyze Family Advocacy Program data (Department of Defense 1981). Suspected incidents of child maltreatment and/or spouse abuse in military families are referred to Family Advocacy Programs where a case review committee, composed of a multidisciplinary team of designated individuals working at the military installation level, is tasked with the evaluation and determination of abuse and/or neglect and the development and coordination of treatment and disposition recommendations (Mollerstrom et al. 1992). (Rentz et al., 2006; p. 94)

Prior research that has studied intimate partner violence or child abuse in families of military servicemen have either (i) focused on military populations and studied the prevalence of

domestic violence among these individuals (Taft et al. 2005; Marshall, Panuzio, and Taft 2005; Forgey, and Badger, 2006; Defense Task Force on Domestic Violence, 2003; Campbell et al. 2003; Sayers, Farrow, Ross, and Oslin 2009), or (ii) compared domestic violence rates of military service members to civilians to assess the "effect" of military-related stress (Griffin and Morgan 1988; Cronin 1995; Heyman and Neidig 1999). Studies comparing military servicemen to civilians have generally found that spousal abuse is more common among military than civilian families (Griffin and Morgan 1988; Cronin 1995; Heyman and Neidig 1999), while findings on child mistreatment have been more mixed. Some studies find that child mistreatment is more common among military families than civilian families (Gessner and Runyan 1995; North Carolina Child Advocacy Institute 2004) while others find that it is less common (Raiha and Soma 1997; McCarroll et al. 2004) and still others find no differences (Dubanoski and McIntosh 1984).

Attributing differences in domestic abuse rates between military and civilian families to military service is problematic for a number of reasons. First, men who select into military service are different on a wide set of characteristics from civilians (Dobkin and Shabani 2009), and many of these characteristics are also related to the likelihood of domestic violence. Military servicemen tend to be drawn from family backgrounds of lower socioeconomic status (Segal et al., 1998; Bachman et al., 2000; Kleykamp, 2006) with fewer civilian labor market opportunities; they also tend to be in better physical and mental health prior to entry into the military because of rigorous health screening policies (see Department of Defense Directives 6130.3 and 6130.4). In addition, the tastes and personality traits of the average civilian may differ from that of a self-selected serviceman. Because many of these characteristics are both difficult-to-measure and have been found to be correlated with the likelihood of domestic violence (Aizer 2010;

3

Angelucci 2008; Pollack 2004; Tjaden and Thonnes 1998; Dugan, Nagin, and Rosenfeld. 1999), civilians may comprise a poor counterfactual group for servicemen. In addition, it may be that the partners and children of servicemen differ in substantial ways from partners and children of civilians (Larsen et al., 2011). And there is evidence that victims of violence also tend to be drawn from households of lower socioeconomic status (Sabia, Dills, and DeSimone 2013).

Economists studying the effects of military service on broader measures of violence such as violent crime (Lindo and Stoeker Forthcoming; Rohlfs 2010) have utilized the draft lottery to generate exogenous variation in service. However, the absence of a draft in the Global War on Terrorism (GWOT) does not permit the use of this particular natural experiment. Thus we exploit a new natural experiment: deployment assignment among active duty military personnel. To identify the causal effect of combat exposure, we rely on evidence that Human Resources Command treats active duty servicemen of equivalent rank and occupation as essentially perfect substitutes when making unit deployment assignments (Lyle 2006). This natural experiment, while identifying a different local average treatment effect than the draft lottery approach, should produce unbiased estimates of the effect of randomly drawing an active duty serviceman into combat service.

Using data drawn from two data sources, the National Longitudinal Study of Adolescent Health (Add Health) and the 2008 Department of Defense Health and Related Behaviors (HRB) Survey, this study is the first to estimate the effect of combat service on domestic violence, which includes intimate partner violence and child maltreatment. In addition, our measures permit us to examine potential precursors to violence, which include verbal arguments and other dimensions of relationship quality. Our results suggest that combat service is associated with a substantially increased risk of domestic violence against intimate partners and children. This

finding is robust across datasets as well as to controls for pre-deployment propensity to engage in violent behavior. We find that up to three quarters of the estimated effect of combat exposure on domestic violence can be explained by the increased stress- and substance use-related consequences of war.

2. Background

2.1 *Prevalence of Domestic Violence.* According to the National Intimate Partner and Sexual Violence Survey (NIPSV), conducted by the Center for Disease Control and Prevention (CDC), about 1 in 4 women have suffered from severe physical violence. Recent statistics suggest that, over the course of their lives, 11.2 percent of women have been beaten by an intimate partner, 17.2 percent have been slammed against something, and 14.2 percent have been hit with something hard or a fist. Within the past year, it is estimated that 2.7 percent of women (or approximately 3.2 million women) have experienced such violence (Black et al., 2010). In addition to intimate partner violence, child maltreatment is the leading cause of injury-related death among children who are older than one year (Institute of Medicine 1999). According to CDC (2012), state and local child protective services in the United States reported that an estimated 695,000 children were victims of child maltreatment in 2010. Each year, the U.S. spends $4.1 billion on direct medical and mental health care services to treat the victims of domestic violence (CDC 2003). The total costs of domestic violence—including lost productivity (in both the labor market and household) of those who survive as well as foregone lifetime earnings of those killed—have been estimated to exceed $5.8 annually (CDC 2003).[1]

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[1] See recent work by Sabia, Dills, and DeSimone (Forthcoming) and Rees and Sabia (Forthcoming) for evidence on the human capital and earnings effects of sexual violence victimization.

2.2 *Theoretical Mechanisms.* Sociologists and psychologists have offered a number of theoretical explanations for domestic violence. Agnew's (1992) General Strain Theory (GST) argues that presence of strain leads to negative affective states, including but not limited to anxiety, depression, fear and anger, which in turn leads to violent behaviors with the intention of minimizing or eliminating the source of strain. Empirical evidence suggests that both stress in general (Card and Dahl 2011) and occupational stress in particular (Gibson, Swatt, and Jolicoeur, 2001) have been found to be associated with increased levels of domestic violence against women and children.

Combat service is known to be one of the highest stress occupations, raising concerns that family members of such employed men may be at risk for potential abuse. A number of studies by both public health researchers (Hoge et al., 2006, 2004; Erbes et al., 2007; Rosenheck and Fontana, 2007; Seal et al., 2007; Tanielian and Jaycox, 2008) as well has health economists (Cesur, Sabia, and Tekin 2013) have documented the effects of combat exposure on stress-related mental health ailments, such as Post-Traumatic Stress Disorder. This could represent an important mechanism through which combat service could affect domestic violence.

In addition to the direct effects of stress-related ailments on domestic violence, the indirect stress-related consequences of combat could also influence the likelihood of violence. A number of studies have found that war service increases substance use. For instance, those drafted to combat in World War II, Korea, and the Vietnam War have been found to be more likely to use drugs (Price et al., 2004) and drink alcohol excessively (McFall et al., 1992). Descriptive (Thomsen et al., 2011; Hooper et al., 2008; Jacobson et al., 2008) as well as more careful causal studies (Chesney et al. 2013) have found that servicemen deployed to combat in GWOT are more likely to use illegal drugs, and abuse alcohol. The effects of substance use on

domestic violence have been well-documented as well. Substance use has been found to be associated with increased likelihood of child maltreatment (Markowitz and Grossman, 1998, 2000), and intimate partner abuse (Angelucci 2008; Markowitz 2000; Klosterman and Fals-Stewart, 2006; Exum 2002; Stuart et al. 2008; El-Bassel et al. 2005; Kyriacou et al. 1999).[2]

While the direct and indirect effects of war combat on stress might explain a portion of the relationship between war and domestic violence, there are other channels as well. The normalization of violence—often known as a "pathologic adaption to violence"—may be yet another mechanism (Schwab-Stone et al., 1995). A number of studies in the sociology and psychology literature find that younger individuals who are pathologically adapting to violence may be desensitized to repeated violence, which both protects those who are exposed to violence and increases their propensity to commit violent behaviors (Dubrow and Garbarino, 1989; Garbarino, 1995, 1999; Garbarino and Kostelny, 1997; Pollack 2004). Grossman and Siddle (1999) have conjectured that combat exposure as well as combat training may permanently break down the mind's natural barriers to committing violent acts.[3]

Finally, combat service may affect the likelihood of domestic violence by its effect on the distribution of potential mates (and the distribution of mate quality) available to the servicemen. For example, a well-established assortative mating literature in the social sciences documents that female and male partners share similar traits and come from comparable socioeconomic classes (Belot and Francesconi, 2013). Therefore, those that are willing to partner with servicemen who have served in combat may be those from military families who may themselves have been exposed to the violence.

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[2] Identification of substance use effects has generally come from policy variation in beer taxes or via cross-regional variation in drug prices.

[3] See Grossman (2009) for a discussion of how the U.S. military implemented different training methodologies to reduce soldiers' reluctance to fire on the battlefield.

2.3 *Literature.* A number of recent studies in the economics literature have studied the effect of war service on violent crime (Rohlfs 2010; Galiani, Lindo and Stoecker, Forthcoming)[4]. Their findings uniformly suggest that those drafted into war service are more likely to commit violent crime. This could suggest that the violent effects of combat spill over into the household as well. Angrist and Johnson (2000) find mixed evidence suggesting that deployment of male soldiers has no effect on divorce, while deployment of female soldiers increases divorce.[5] But no studies have used a natural experiment approach to identify the effects of war service on intimate partner violence or child abuse.

A number of descriptive studies in the have examined the relationship between combat service and domestic violence (Taft et al. 2005; Marshall, Panuzio, and Taft 2005; Forgey, and Badger, 2006; Defense Task Force on Domestic Violence, 2003; Campbell et al. 2003; Sayers, Farrow, Ross, and Oslin 2009; Heyman and Neidig, 1999; Griffin and Morgan 1988; Cronin 1995; Gessner and Runyan 1995; North Carolina Child Advocacy Institute 2004; Raiha and Soma 1997; McCarroll et al. 2004; Dubanoski and McIntosh 1984). While these studies have provided some suggestive evidence that combat service is positively related to domestic violence, their failure to address the endogeneity of service suggests that their estimates should be taken with a grain of salt.

The current study is the first in the literature to estimate the causal impact of combat service on intimate partner violence, child abuse, and relationship quality. Moreover, we explore a number of mechanisms through which combat service may cause domestic violence, including combat-induced stress and substance use.

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[4] There are also a number of correlational studies (see, for example, Black et al. 2005; Bouffard 2003; King and King 2000; Kulka and others 1990a, 1990b; Mumola 2000), which have reached a similar conclusion.

[5] However, a RAND study by Karney and Crown (2007) suggests little evidence that deployment increase divorce rates among enlisted members of the Armed Forces.

3. Data and Measures

The current study uses data drawn from two surveys—the National Longitudinal Study of Adolescent Health (Add Health) and the Department of Defense Health and Related Behaviors (HRB) Survey. Each dataset has advantages and disadvantages that we discuss below.

3.1 *Add Health.*

Overview. The Add Health is a nationally representative school-based survey that initially interviewed respondents in seventh through twelfth grades in the 1994-1995 academic year (Baseline Survey). In-home surveys were completed by 20,745 baseline respondents ages 11 to 18. In addition; a parental questionnaire was completed by the respondent's parent or guardian, usually the biological mother. Information was collected on health, education, family background, cognitive ability, and risky behaviors, including violence. In subsequent years, three follow-up surveys to Add Health's Baseline Survey were conducted. The first in the 1995-96 school year (First Follow-Up Survey), the second in 2001-2002 when respondents were ages 18 to 26 (Second Follow-Up Survey), and the third in 2007-2008 when respondents were ages 28 to 34 (Third Follow-Up Survey). Our analysis focuses on the Third Follow-Up Survey (Wave IV) when respondents were in young adulthood.

Measures. At Wave IV, there were 753 men who reported active duty service in the United States Military, 79.8 percent of whom served in the Global War on Terrorism (post-September 2001). The analysis sample is restricted to 482 active duty male soldiers who were deployed overseas. Our key measure of combat in the Add Health, *Combat Service*, is an indicator is set equal to 1 for those who were assigned to a combat zone and set equal to zero for

9

those who were assigned to an overseas deployment in a non-combat zone.[6] In the Add Health

sample, 75.5 percent of those deployed overseas (N = 364) were assigned to combat zones, while

the remainder (118) were assigned to non-combat zones.

We also experiment with an alternate measure of combat, *Combat Exposure*. The Add

Health contains information on whether the respondent "engaged the enemy in firefight."

Combat Exposure is set equal to 1 if a respondent reported assignment to a combat zone where

he engaged in enemy firefight, and is set equal to 0 if the respondent reported assignment to a

non-combat zone *or* assignment to combat zone without enemy firefight. Among those who

reported combat service (N = 364), 48.6 percent (N = 177) reported combat exposure.

We measure domestic violence in the Add Health using information gathered from male

respondents at Wave IV. Our first measure, *Threaten,* is generated using responses to the

following questionnaire item about the respondent's current partner[7]:

> *How often (have/did) you threatened {your partner} with violence, pushed or shoved her,
> or thrown something at her that could hurt*?

Threaten is set equal to 1 if the respondent reported that he had threatened violence, pushed or

shoved his partner, or thrown something at his partner in the last year; it is set equal to 0

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[6] Combat zones are designated by an Executive Order from the President as areas in which the U.S. Armed Forces
are engaging or have engaged in combat. For a further description, see: http://www.irs.gov/uac/Combat-Zones
[7] The reference partner was decided by the survey administers based on the following criteria: "This section is
administered for ONE current partner. If there are multiple current partners, priority is: marriage partner,
cohabitation partner, pregnancy partner, dating partner. If two or more partners fall in the same type of relationship,
the longer/longest relationship is selected. If two or more partners fall in the same type of relationship, and they are
of the same duration, then the respondent is asked to pick the partner they care about the most. If there are no current
partners then the most recent partner is selected. If there is no current partner and no most recent partner, end dates
for each marriage, cohabitation, and relationship with a pregnancy are reviewed to select the one partner with the
most recent end date. If two or more partners have the same end date, select the longer/longest relationship."

otherwise.[8] Among our sample of deployed servicemen, 5.67 percent (N = 27) report having

threatened their partner, pushed her, or thrown something at her.

Our second measure of abuse, *Hit*, is generated using responses to the following survey

item:

How often (have/did) you (slapped/slap), hit, or (kicked/kick) {your partner}?

Hit is set equal to 1 for those respondents who answered that they had slapped, hit, or kicked

their partners in the last year and is set equal to 0 otherwise. 3.15 percent of the sample (N =15)

reported having committed this form of abuse.

Our final domestic abuse measure, *Injury*, was generated using answers to the following

survey item:

How often (has/did) {your partner} (had/have) an injury, such as a sprain, bruise, or cut because of a fight with you?

Injury is set equal to 1 for those who reported injuring their partner in the last year and is set

equal to 0 otherwise. 1.68 percent of the sample (N = 8) reported injuring their partner.

There are a few limitations of our domestic violence measures. First, they are self-

reported, which may understate the true prevalence of intimate partner violence. However, as

long as this underreporting is not systematically correlated with combat service, our estimates

should be unbiased.

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[8] The full set of responses available to this question, as well as the following two Add Health domestic violence items, included " never; this has not happened in past year, but happened before then; once in the last year of the relationship; twice in the last year of the relationship; 3 to 5 times in the last year of the relationship; 6 to 10 times in the last year of the relationship; 11 to 20 times in the last year of the relationship; more than 20 times in the last year of the relationship)"

Second, our definition of domestic violence measures conflates being in a relationship with an intimate partner with violence. If combat exposure affects the likelihood of being in a relationship, then the estimated effects of combat service on domestic violence could be biased if those who do not enter into a relationship are more (or less) likely to commit intimate partner violence. To address this concern, we also present estimates of the relationship between combat exposure and the likelihood of being in an intimate partner relationship, as well estimates that condition the above domestic violence measures on being in a relationship.[9]

3.2 DOD HRB Survey

Overview. The 2008 Department of Defense Health and Related Behaviors dataset was collected by RTI to measure the well-being of military personnel serving in GWOT. The survey consists of 28,546 active duty military servicemembers, of which 20,927 were male— 4,320 from the Army, 4,909 from the Navy, 3,837 from the Marine Corps, 4,873 from the Air Force, and 2,988 from the Coast Guard. The survey was completed via anonymous surveys distributed at military installations to respondents ages 18 to 54. When weighted, the survey is designed to be representative of US servicemembers in all pay grades serving throughout the globe.[10] (See Bray et al. 2009 for more detailed information on the DOD HRB data collection strategy.) Our main sample consists of 11,542 active duty male respondents (2562 soldiers, 3,370 sailors, 2,505 marines, and 3,093 airmen) who had deployed overseas and who provided non-missing information on combat exposure and domestic violence. An important advantage of the HRB data, therefore, is a much larger, representative sample.

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[9] We also experimented with conditioning the sample on those who were in a domestic partner relationship at the time the domestic violence question was asked.

[10] However, the sample excludes those who were absent without official leave, attending a service academy, or who were incarcerated at the time of data collection effort.

Measures. There is no analogous measure of *Combat Service* available in the HRB Survey, as the HRB survey does not provide information on whether lifetime overseas deployments were made to a combat zone or not. However, the data do contain analogous information on *Combat Exposure.* As in the Add Health, this measure is set equal to 1 if the respondent reported receiving "income fire from small arms, artillery, rockers or mortars" or having their "unit fire on the enemy." *Combat Exposure* is set equal to 0 for those who are assigned to combat zones without enemy firefight or who are assigned to non-combat zones. In our sample of 11,542 overseas deployed servicemen, 51.5 percent (N = 5,948) reported combat.

The inability to disaggregate those for whom *Combat Exposure = 0* has potentially important implications. Assignment to a combat zone—even one in which firefight does not materialize—could potentially induce stress (beyond that seen from those deployed to non-combat zones) that could affect the likelihood of domestic violence. Pooling those assigned to non-combat zones with those assigned to combat zones without combat exposure could potentially understate the domestic violence effects of combat.

Information on domestic violence and relationship quality is more extensive in the HRB Survey than in the Add Health. First, respondents were asked how often in the last twelve months they had engaged in the following forms of domestic abuse[11]:

> *I hit my spouse, live-in fiancé, boyfriend or girlfriend, or the person I date.*
> *I hit my child(ren) for a reason other than discipline (spanking)*

Any Abuse is coded as equal to 1 if the respondent reported having hit their spouse, live-in fiance, girlfriend, person they date, or children (for reasons other than discipline) in the last

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[11] Possible responses to these statements included: 3 or More Times in the Past 12 Months; 2 Times in the Past 12 Months; 1 Time in the Past 12 Months; 0 Times in the Past 12 Months.

year; it is set equal to 0 if no abuse is reported. In addition to this *Any Abuse* measure, we also disaggregate intimate partner abuse from child abuse, *Partner Abuse* and *Child Abuse*. 2.26 percent of our sample (N = 261) reported committing any abuse, 1.75 percent (N = 201) reported intimate partner abuse, and 1.26 percent (N = 145) child abuse.

The HRB survey also contained information on the degree of harmony in relationship, measured by stress in relationships and potential relationship break-ups. First, respondents are asked how often they reported a potential break-up:

My spouse or live-in fiancé/ boyfriend/girlfriend threatened to leave me or left me.

Break-up is coded as 1 if a respondent reports that his partner threatened to leave him in the last 12 months and 0 otherwise. 13.5 percent of the sample (N = 1,552) reported that their partners had threatened to leave them or had broken up with them. Note, however, that this measure may produce misleading results if victims of violence are too frightened to threatened to leave their partners.

Next, respondents are asked:

During the past 12 months, how much stress did you experience in your family life or in a relationship with your spouse, live-in fiancé, boyfriend or girlfriend, or the person you date seriously?

Relationship Stress is coded as 1 if the respondent reported serious relationship stress in the last year and 0 otherwise. 16.37 percent of the sample (N = 1,875) reported serious relationship stress in the last year.

Finally, respondents are asked about heated arguments with family or friends, which could include partners, spouses, or children. Servicemen are presented with the following statement:

I had heated arguments with family or friends.

Argument is coded equal to 1 if respondents reported having heated arguments with family or friends in the last year and zero otherwise. We find that 30.97 percent of the sample (N = 3,556) reported heated arguments with family or friends.

3.3 Main Advantages and Disadvantages of Each Dataset

The chief advantage of the HRB Survey is that it produces estimates that are more generalizable to the active duty population than the younger sample available in the Add Health. Moreover, because of the large sample size, relatively precise, branch-specific estimates can be obtained. However, an important disadvantage of the HRB Survey is that it does not contain information on military occupation, one of the few variables on which Human Resources Command has information and which may influence deployment decisions. The lack of this information poses a potential threat to our natural experiment.

The advantage of the Add Health is that it contains information on all of the observables available to Human Resources Command—including military occupation—when making deployment decisions. Thus, our natural experiment is theoretically more credible with these data. Moreover, because the data are longitudinal in nature, we can empirically explore whether deployment assignment is related to a wide set of family and individual background characteristics, including pre-deployment propensity for violence. The disadvantage of the Add

Health is its relatively small sample size, which reduces the precision of estimates, as well as its generalizability given that it focuses only on young adults.

3.4 Basic Descriptive Statistics

In Tables 1A and 1B, we show the means of the outcome variables by deployment assignment. In the Table 1A, means from the Add Health suggest that domestic violence rates for those for whom *Combat Service = 1* is higher than those for those for whom *Combat Service = 0.* For instance, 6.9 percent of those assigned to combat zones reported that they had threatened, pushed, or shoved their partner, as compared to 1.8 percent of those assigned to non-combat zones. However, rates of domestic abuse appear similar for those assigned within-combat zones; those assigned to combat zones with firefight had similar rates of domestic violence as those assigned to combat zones without combat exposure.[12] There is also some evidence that relationship formation is less likely for those assigned to combat. Importantly, *pre-deployment* rates of violence (or propensity for such violence) were statistically equivalent across deployment location, consistent with the hypothesis of exogenous assignment.

In Table 1B, we show similar descriptive statistics for the HRB data. The results show that rates of intimate partner violence and child abuse were significantly higher among those exposed to combat as compared to those deployed to non-combat zones or to combat zones without enemy firefight. There is also evidence that relationship quality is lower for those exposed to combat. To take an example, 15.3 percent of respondents who were assigned to combat reported breaking up or threatening a breakup with their partner in the last year, as compared to 11.3 percent of those for whom *Combat Exposure = 0*.

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[12] The share of those in each branch of service was statistically equivalent across each deployment assignment.

4. Identification

The process by which deployment assignments of active duty U.S. Armed Forces personnel are made is not well known. Individual servicemen are, in fact, rarely deployed. Rather, individual soldiers are assigned and then re-assigned to units every three to five years, and it is these units that are deployed (Lyle 2006). Deployment assignments are based on two exogenous factors: the operational needs of the U.S. military, which are driven by world events, and the readiness and availability of units, which is determined by timeliness of equipment being inventoried and cleared for shipment, completion of specified training, and occupational skill set of unit members (Army Regulation 220-1).

Human Resources Command views servicemen of equivalent military rank, occupation, and branch as interchangeable when making unit deployment decisions. Conditional on this small set of observables, deployment assignments are made independently of servicemen's family background, home life circumstances, personality, marital status, relationship quality, predisposition for violence, and other individual characteristics (Engel et al. 2010).

> "As a rule, [Human Resources Command] do[es] not take into consideration the welfare of an individual enlisted soldier...nor do they consider the average characteristics of units and families." (Engel et al., 2010, p. 76)

In fact, Human Resources Command only has a small set of observables—military rank, occupation, age, and cognitive ability—available to it when deployment decisions are made. And these observables are largely available in the Add Health dataset.

This natural experiment in deployment assignment has been increasingly used by labor and health economists to identify the causal effect of combat on a number of outcomes of both servicemembers and their families. For example, exogenous servicemember assignment has

been used to identify the causal effect of deployment on child test scores (Lyle 2006; Engel et al. 2010), servicemember mental health (Cesur et al. 2013), and risky health behaviors (Chesney et al. 2013).

One way to descriptively explore whether deployment assignment can be treated as random is to examine whether servicemen's assignment is related to a myriad of individual and family background characteristics. Therefore, we begin by drawing data from the Add Health, and estimate:

$$Combat = \beta_0 + \beta_1'\mathbf{M} + \beta_2'\mathbf{X} + \varepsilon \qquad (1)$$

where $\mathbf{X}$ is a wide set of individual and family background characteristics generally measured prior to deployment (age, race, education, parental income, parental marital status, maternal education, and religion) as well as pre-deployment measures of violence, including serious physical fight and parental physical maltreatment prior to age 18 ; and $\mathbf{M}$ is a set of military controls, including rank, occupation, branch, and timing of service. If deployment assignment is exogenous, we should find that conditional on military characteristics, background characteristics are unrelated to deployment assignment,

The findings in Table 2 present the results of this approach. Column (1) compares respondents for whom *Combat Service* = 1 to *Combat Service* = 0 (combat zone vs non-combat zone); column (2) compares respondents for whom *Combat Exposure* = 1 to *Combat Service* = 0 (combat zone with firefight vs non-combat zone); column (3) compares respondents for whom *Combat Exposure* = 1 to *Combat Exposure* = 0 (combat zone with firefight vs combat zone without firefight or non-combat zone); and column (4) compares respondents for whom (*Combat*

Exposure = 0 and *Combat Service* = 1) to *Combat Service* = 0. (combat zone without firefight vs

non-combat zone). Across comparisons, we find little evidence that individual, family

background, or pre-deployment violence propensity predicts deployment assignment. Only

being Hispanic seems negatively related to deployment assignment. All regressions control for

race/ethnicity and robustness checks on a non-Hispanic white sample of males produce a similar

pattern of results to those produced below. Taken together, the estimates in Table 2 provide at

least suggestive evidence consistent with the hypothesis that deployment assignment is random,

conditional on a small set of military observables.

Our approach is therefore to rely on this natural experiment to identify the effects of

combat exposure on domestic violence by estimating the following:

$$\text{Domestic Violence} = \delta_0 + \delta_1 \text{Combat} + \delta_2'\mathbf{M} + \varepsilon \qquad (2a)$$

$$\text{Domestic Violence} = \delta_0 + \delta_1 \text{Combat} + \delta_2'\mathbf{M} + \delta_3'\mathbf{X} + \varepsilon \qquad (2b)$$

If the background characteristics, including pre-disposition for violence, are exogenous to

deployment assignment, then estimates of δ_1 from equations (2a) and (2b) should be statistically

equivalent.

As noted above, one limitation with the HRB Survey data is the inability to control for

military occupation, a key variable in the vector **M** upon which deployment assignment may

depend. To attempt to control for factors related to military occupation, we are careful to control

for educational attainment as well as detailed measures of installation assignment in the HRB

Survey. However, we do allow that the natural experiment with the HRB data may be

contaminated.

To judge the magnitude of any bias, we take two approaches. First, we limit the set of observables in **M** and **X** to the set of controls available in both datasets. We then compare the estimate of δ_1 in the Add Health using the full set of controls with the estimate of δ_1 in the Add Health using the more limited set of controls available in the HRB Survey. This will give us a sense of the magnitude and direction of any bias we observe in the HRB data.

A second approach we take is to use propensity score matching in the HRB data to ensure that those deployed to combat and non-combat share common support on observables. First, we estimate the probability of *Combat Exposure* via probit of the following form:

$$Combat\ Exposure_i = \delta_0 + \delta_1 \mathbf{K}_i + v_i \tag{3}$$

where $\mathbf{K}_i$ includes military rank, individual's Major Command (MAJCOM), frequency of deployments, age, race, and educational attainment, which are the set of observables covariates available in the DOD HRB survey. To ensure common support, we use nearest neighbor matching to match each serviceman for whom *Combat Exposure*=1 with a servicemen for whom *Combat Exposure* = 0 using predicted probabilities of combat exposure within 0.00015, while trimming 9 percent of observations that had predicted probabilities farthest away from the minimum and maximum predicted probabilities. After matching, the mean differences in the domestic violence and relationship quality outcomes were calculated to generate the propensity score matching estimates. Standard errors are then generated via bootstrapping.

We also attempt the same propensity score matching strategy in the Add Health using the limited **K** matching variables and compare these estimates to propensity score matching

estimates using the full set of controls in **M** and **X** to gauge the magnitude and direction of any bias in estimates obtained via the HRB data.

5. Results

Our main findings appear in Tables 3-8. Heteroskedasticity-corrected standard errors are in parentheses and sample sizes are in brackets.

5.1 *Main Add Health Results.*

Table 3A presents our main findings using the Add Health data. Row (1) of Panel A presents estimates from equation (2a). We find that those deployed to combat zones have a 6.0 percentage-point higher probability of threatening or pushing their partner (column 1), a 5.0 percentage-point higher probability of slapping, hitting, or kicking their partner (column 2), and a 3.2 percentage-point higher probability of injuring their partner (column 3) than their counterparts deployed to non-combat zones. The inclusion of controls for family and individual background characteristics (row 2) and pre-deployment propensity for violence (row 3) have little effect on the magnitude of the estimated effects, lending support to the hypothesis that deployment assignment is exogenous to a wide set of personal characteristics.

In Panel B, we allow for differential effects of *Combat Service* depending on whether the serviceman assigned to a combat zone actually was exposed to enemy firefight (*Combat Exposure*). By including both *Combat Exposure* and *Combat Service without Exposure* in the regression, the coefficient on *Combat Service* can be interpreted as the effect of a deployment assignment to a combat zone where the serviceman did not see enemy firefight. The omitted group remains those who were assigned to non-combat zones. The findings in Panel B suggest

21

that assignment to a combat zone –whether or not that respondent saw enemy firefight—is associated with substantial increases in the risk of intimate partner violence. In no case can we reject the hypothesis that the estimated domestic violence effects are significantly different for those assigned to combat zones with firefight compared to those assigned to combat zones without such firefight materializing.

In the remaining panels (B-E), we present branch-specific estimates for the Army, Marines, and Navy. Too few observations remain to estimate the Air Force sample separately. Despite the imprecision of estimates, our results suggest that the effects of combat on domestic violence are strongest for those in the Army and Marines as compared to the Navy. This finding is consistent with earlier research that suggests that the adverse stress- and risky behavior-related effects of combat are largest for the Army and Marines (Cesur et al. 2013; Chesney et al. 2013).

Interpreting the estimated domestic violence effects in Table 3A could prove complicated given how combat service might affect relationship formation. If combat assignment induces more (or less) relationship formation, then estimates in Table 3A may be biased if the propensity for violence in that relationship is higher (or lower). For instance, if those who are deterred from relationship formation by combat had formed relationships, it is possible that those relationships would have been violent, biasing downward our previous estimates. Moreover, combat service could affect the likelihood of entering into heterogeneously-matched relationships differently. For example, combat could induce poorer match short-term relationships for coping, but deter longer term better matches because of the psychological consequences of combat. Thus, combat could affect both match quality and match length in complicated ways. While we do not formally attempt to disentangle these relationship selection effects, in Table 3B, we explore the effects of combat service on domestic violence *conditional*

22

on being in a relationship as well as the effect of combat on the probability of being in a relationship. The results in Panel A suggest that assignment to a combat zone is associated with an increased risk of domestic violence among those in a relationship across each of our three measures (columns 1-3) as well as a marginally significant 9.9 percent (0.083/0.842) decline in the probability of being in a relationship.

The findings when we separate out those in combat zones exposed to firefight and not exposed to firefight (Panel B) generally produce a similar pattern of results, as do the branch-specific estimates (Panels C-E), though they are very imprecisely estimated.

5.2 Main DOD HRB Results.

In Table 4A, we turn to results from the HRB Survey. As noted above, these data only allow us to measure *Combat Exposure*, so to the extent that those assigned to combat zones without enemy firefight also incur stress that induces domestic violence, these estimates may be biased downward. The findings in Panel A of Table 4A produce consistent evidence that combat exposure is associated with substantial increases in the risk of domestic violence and diminished relationship quality. We find that combat exposure is associated with a 43.4 percent increase in the probability of any domestic violence, a 44.4 percent increase in the probability of intimate partner violence, a 76.9 percent increase in child abuse, a 20.7 percent higher probability of a high stress relationship, a 24.4 percent increase in the probability of a relationship break-up (or threat thereof), and an 18.3 percent increase in the probability of heated arguments with friends and family.

One of the advantages of the HRB data is the ability to obtain relatively precise branch-specific estimates with much larger sample sizes than in the Add Health. The estimates in Panels

23

B through E again point to large domestic violence effects for the Army and Marines as in the Add Health, but also for the Navy. There is less evidence that those in the Air Force who are exposed to combat are more likely to abuse their partners and families. Again, this pattern of results is generally consistent with prior work that has uncovered the strongest evidence for stress-related effects of combat among those in the Army and Marines (and to a lesser extent, Navy).

In Panel 4B, we repeat the exercise in Table 3B for the HRB data. We find that conditional on being in a relationship, combat exposure is associated with increases in the risk of domestic violence, particularly among children) and diminished relationship quality (columns 1-6), but little evidence that combat exposure affects the likelihood of being in a relationship (column 7), having children (column 8), or having children conditional on being in a relationship (column 9). Branch-specific estimates are generally smaller, but show a similar pattern.

Assessing Bias in HRB Data Estimates. As noted above, the key drawback of the HRB data is the lack of controls for military occupation, a key measure available to Human Resources Command. To ensure that those for whom *Combat Exposure* = 1 and *Combat Exposure* = 0 share common support on observables related to occupation, we use nearest neighbor matching. Table 5 presents evidence on the balance of covariates after matching. We find that those who were exposed to combat are statistically indistinguishable from their non-exposed counterparts across the range of observables from military rank, MAJCOM, number of deployments, educational attainment, gender, age, race, and marital status. Table 6A presents the propensity score matching estimates. The estimates obtained from the PSM procedure are very similar (both qualitatively and quantitatively) to the OLS estimates using the HRB survey which are presented in Table 4A.

While the matching procedure assured matching on observables, there could still be unobservables related to occupation and domestic violence that continue to bias estimates obtained from the HRB data. To gauge the magnitude and direction of that bias, we attempt two strategies. First, we estimate equation (2b) in the Add Health, omitting from **M** and **X** any observables that are not available in the HRB data. Assuming that the natural experiment is clean in the Add Health data, a comparison of estimates of δ_1 from an equation that omits those observables and includes them should allow us to sign and magnify the bias.

Row (1) of Table 6B shows estimates of equation 2(b) including only the HRB-available observables as controls. Uniformly, the results suggest that failing to control for the full set of relevant observables in the Add Health actually *understates* the effect of combat on domestic violence. In row (2) of Table 6B, we repeat the exercise using propensity score matching in the Add Health, again only matching on the observables available in both datasets. The results again point to evidence that the DOD estimates may, if anything, be biased downward.

5.3 Exploring the Mechanisms

The existing literature suggests at least four mechanisms through which combat service may affect domestic violence and relationship quality: psychological stressors, substance abuse, assortative mating, and normalization of violence. Both data sets used in the analysis provide information on psychological stressors (PTSD, suicidal ideation, and stress scales) and substance abuse (drug use and binge drinking). Recent work by Cesur et al. (2013) and Chesney et al. (2013) suggests that combat service increases the risk of Post-Traumatic Stress Disorder, anxiety disorders, and substance use. Therefore, in Tables 7A and B, we explore whether and to what

extent these measures mediate the relationship between combat service and the outcome measures.

Table 7A presents the results for the HRB data. Among the HRB survey participants, controlling for PTSD, suicide ideation, and anxiety disorders[13] reduces the magnitude of the association between *Combat Exposure* and *Any Abuse* (Panel A) by approximately 30 percent, while binge drinking and drug use explain approximately 40 percent of the association. Together, drug use and psychological stresses explain approximately 60 percent of the relationship between combat exposure and the commission of domestic abuse.

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[13] In the HRB survey:

PTSD is created in the following fashion:

Questions asked whether participants had a loss of interest in activities that used to be enjoyable, being extremely alert or watchful, having physical reactions when reminded of a stressful experience, and feeling jumpy or easily startled. Respondents were asked to indicate how much they had been bothered by each of the 17 experiences in the last 30 days; response options were not at all, a little bit, moderately, quite a bit, and extremely. Each statement was scored from 1 to 5, and a sum for all items was computed. The standard diagnostic cutoff was used such that if the sum were greater than or equal to 50, participants were classified as needing further evaluation for current (past month) PTSD; those with a score less than 50 were considered not to need further evaluation.

Psychological Stress:

Questions asked how often they felt nervous, hopeless, restless, or fidgety; so depressed nothing could cheer them up; that everything was an effort; and worthless in the past 30 days. The five-point scale ranged from 0 to24 with response options from "none of the time" to "all of the time." Items were summed and the standard cutoff of 13 or more indicated possible serious mental illness

Measures of substance abuse in the HRB data are constructed based on the following questionnaire items:

Suicidal Ideation is created based on the following questionnaire item:

> *If you have ever seriously considered suicide, when did this occur? (Mark all that apply.) Within the past year.*

Drug Use is created based on the following questionnaire item:

> *"Past 30 Days, Any Illicit Drug Use Except Steroids, Sexual Enhancers, Analgesics"*

Binge Drinking is created by the DOD HRB survey if respondent reported drinking five or more drinks in one occasion in the past 30 days.

In Panels B through F, we conduct the same exercise using other measures of domestic abuse and relationship quality. The results continue to suggest that combat-induced stress and substance use strongly mediate the relationship between combat exposure and domestic violence as well as domestic violence and relationship quality. In sum, these factors appear to explain 33.3 to 61.7 percent of the relationship.

In Table 7B, we repeat the exercise in Table 7A using the Add Health data. While we do find that the estimated association between combat and domestic violence falls with the inclusion of controls for stress and substance use, the decline we observe is not sharp as seen in the HRB data; rather, we can explain only 10 to 15 percent of the estimated effect. One explanation for this might be that the stress disorder measure available in the HRB data is more detailed relative to the measure available in Add Health. [14]

5.4 *Alternate Definitions of Combat*

Finally, we experimented with alternate measures of combat exposure available in the Add Health and in the HRB Survey. Specifically, respondents were asked about whether they

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[14] The PTSD variable in the Add Health data is generated based on the following survey question:
> *Has a doctor, nurse or other health care provider ever told you that you have or had: post-traumatic stress disorder or PTSD?*

The binary PTSD variable is coded as 1 for the respondents who reported PTSD diagnosis and 0 otherwise.

We used the Cohen Perceived Scale variable created by the Add Health based on the following four questions.
> *1. In the last 30 days, how often have you felt that you were unable to control the important things in your life?*
> *2. In the last 30 days, how often have you felt confident in your ability to handle your personal problems?*
> *3. In the last 30 days, how often have you felt that things were going your way?*
> *4. In the last 30 days, how often have you felt that difficulties were piling up so high that you could not overcome them?*

Possible responses to the above items and the per-item Cohen scale associated with each response were as follows: "never" (=0); "almost never" (=1); "sometimes" (=2); "fairly often" (=3); "very often" (=4). The scores from questions *(2)* and *(3)* are reversed and the overall Cohen Perceived Stress Scale was created by adding up the responses, ranges between 0 and 16 with higher values corresponding to higher stress levels.

believed they had killed anyone in battle, were wounded or injured themselves in battle, and whether they had observed an ally killed or wounded.[15] We use the responses to these measures to create alternate dichotomous measures of combat. The results of this exercise using the HRB data appear in Table 8A. The odd-numbered columns exclude controls for the mediating factors and the even-numbered columns include them. Each estimate presented in the table comes from a separate regression using an alternate combat definition.

The results in Table 8A show that across our alternate measures of combat (rows) and across all branches (Panels B-E), combat is associated with substantially increased risks of domestic violence. In the HRB data, it also appears to be the case that being injured or wounded has the largest impact on domestic violence, perhaps consistent with the hypothesis of the normalization of violence having a particularly large effect.

In Table 8B, we perform a similar robustness check by employing the alternate combat measures from the Add Health survey. In Panel A, we estimate intimate partner violence indicators on combat service. In Panel B, we repeat the same exercise for injury status during

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[15] Specifically, in the Add Health, respondents were asked:

> Did you ever kill or think you killed someone?
> During your combat deployment, were you wounded or injured?
> During your combat deployment, did you see [coalition or ally] wounded, killed, or dead?

Among deployed active duty male personnel, 29.5 percent (N = 142) reported believing they had killed or had actually killed someone, 8.9 percent (N = 43) reported being wounded or injured in battle, and 39.2 percent (N = 189) reported having observed an ally wounded or killed.

In the HRB survey, respondents were asked:

> Thinking about all of your deployments (combat and noncombat), how many times have you had each of the following experiences?
>
> I was responsible for the death or serious injury of an enemy.
> I was wounded in combat.
> I witnessed members of my unit or an ally unit being seriously wounded or killed.

In the HRB sample, 15.6 percent (N = 1,772) reported being responsible for death or serious injury of enemy, 5.2 percent (N = 587) reported being wounded in battle, and 39.2 percent (N = 2,604) reported witnessing members of their unity or an ally wounded or killed.

combat service, and Panel C uses the measure of whether the respondent witnesses the death or injury of ally indicators. The results generally point to adverse effects of combat service on the likelihood of domestic violence, but again there is no difference in the effects of different combat exposures versus combat zone deployments without such exposures.

6. Conclusions

This study is the first in the economics literature to estimate the effect of war on intimate partner violence, child abuse, and relationship quality. We exploit plausibly exogenous variation on overseas deployment assignment among active duty servicemen to estimate the effect of combat on a number of measures of domestic violence across two datasets. Our findings point to consistent evidence that combat is associated with substantial increases in the risk of domestic violence. We also find evidence that assignment to combat increases the likelihood of being in a relationship with more threats of breakups (or actual breakups) as well as being in a more stressful relationship. Our findings also suggest that combat-induced stress and substance use can explain at least some of the domestic violence effect we observe.

Researchers estimating the impact of war are increasingly focusing on effects not only to the servicemen, but also their families and children (see, for example, Angrist and Johnson 2000; Lyle 2006; Engel et al. 2010). Our paper suggests that the diminished physical health and well-being of servicemen's intimate partners and children should be included as part of the costs of war.

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Table 1A. Means of Domestic Abuse Measures by Combat Status, Add Health

Variable	(1) Full Sample	(2) All	(3) Combat Exposure = 1	(4) Combat Exposure = 0	(5) Combat Service = 0
		Combat Service = 1			
Intimate Partner Violence and Relationship Status					
Threaten	0.057	0.069	0.074	0.065	0.018
	(0.232)	(0.254)	(0.262)	(0.246)	(0.132)
Hit	0.032	0.041	0.040	0.043	0.000
	(0.175)	(0.200)	(0.196)	(0.203)	(0.000)
Injury	0.017	0.022	0.017	0.027	0.000
	(0.129)	(0.147)	(0.130)	(0.162)	(0.000)
In a Relationship	0.842	0.826	0.852	0.801	0.895
	(0.365)	(0.380)	(0.356)	(0.400)	(0.308)
Pre-Enlistment Violence Correlates					
Serious Fight W1	0.420	0.420	0.455	0.387	0.419
	(0.494)	(0.494)	(0.499)	(0.488)	(0.496)
Physical Maltreatment Before 18	0.073	0.075	0.092	0.060	0.068
	(0.261)	(0.264)	(0.290)	(0.237)	(0.253)
Branch of Service					
Army	0.411	0.440	0.537	0.348	0.322
	(0.493)	(0.497)	(0.500)	(0.478)	(0.469)
Marines	0.201	0.181	0.266	0.102	0.263
	(0.401)	(0.386)	(0.443)	(0.303)	(0.442)
Navy	0.247	0.234	0.107	0.353	0.288
	(0.432)	(0.424)	(0.310)	(0.479)	(0.455)
Air Force	0.160	0.173	0.119	0.225	0.119
	(0.367)	(0.379)	(0.324)	(0.418)	(0.325)
Observations	482	364	177	187	118

Notes: The means are generated using data drawn from Wave IV of the National Longitudinal Study of Adolescent Health. Branch of service are not mutually exclusive in the Add Health Data.

Table 1B. Means of Domestic Abuse Measures by Combat Status, DOD HRB Data

Variable	All	Combat Exposure = 1	Combat Exposure = 0
Domestic Violence, Relationship Quality, and Relationship Status			
Any Abuse	0.023	0.028	0.017
	(0.149)	(0.166)	(0.128)
Partner Abuse	0.018	0.022	0.013
	(0.131)	(0.147)	(0.112)
Child Abuse	0.013	0.018	0.007
	(0.112)	(0.133)	(0.083)
Relationship Stress	0.164	0.187	0.139
	(0.370)	(0.390)	(0.346)
Argument	0.310	0.341	0.277
	(0.462)	(0.474)	(0.448)
Break up	0.135	0.156	0.113
	(0.342)	(0.362)	(0.317)
In a Relationship	0.813	0.832	0.793
	(0.390)	(0.374)	(0.405)
Branch of Service			
Army	0.222	0.347	0.089
	(0.416)	(0.476)	(0.285)
Marines	0.217	0.298	0.132
	(0.412)	(0.457)	(0.338)
Navy	0.292	0.125	0.471
	(0.455)	(0.330)	(0.499)
Air Force	0.268	0.231	0.308
	(0.443)	(0.421)	(0.462)
Observations	11542	5948	5594

Notes: The means from the first five columns are generated using data drawn from the 2008 Department of Defense Health and Related Behaviors Survey.

Table 2. Estimated Relationship Between Background Characteristics and Deployment Assignment

	(1) *Combat Service =1* *vs* *Combat Service =0*	(2) *Combat Exposure = 1* *vs* *Combat Exposure = 0*	(3) *Combat Exposure =1* *vs* *Combat Service = 1* *and Exposure = 0*	(4) *Combat Exposure = 1* *vs* *Combat Service = 0*
Serious Fight W1	0.025	0.043	0.038	0.071
	(0.048)	(0.055)	(0.066)	(0.068)
Physical Maltreatment Before 18	-0.017	0.109	0.152	-0.014
	(0.080)	(0.084)	(0.099)	(0.104)
Wave 1 Weight	0.006	0.006	0.003	0.013
	(0.008)	(0.010)	(0.011)	(0.010)
Wave 1 Height	-0.001	-0.000	0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Religion: Protestant	0.034	0.048	0.047	0.058
	(0.064)	(0.061)	(0.081)	(0.079)
Religion: Catholic	0.038	0.020	0.011	0.021
	(0.069)	(0.068)	(0.086)	(0.086)
Religion: Other Christian	0.018	-0.026	-0.019	-0.070
	(0.066)	(0.079)	(0.096)	(0.096)
Religion: Other	-0.111	-0.097	-0.068	-0.156
	(0.107)	(0.110)	(0.148)	(0.135)
F-test on joint significance of Religion	*0.576*	*0.873*	*0.376*	*0.776*
P-value	*0.681*	*0.483*	*0.825*	*0.543*
Age in Years	0.211	-0.270	-0.547	0.231
	(0.368)	(0.470)	(0.563)	(0.476)
Age in Years Squared	-0.004	0.004	0.009	-0.004
	(0.006)	(0.008)	(0.010)	(0.008)
Race: Black	0.004	-0.109	-0.139	-0.049
	(0.055)	(0.074)	(0.089)	(0.093)
Race: Other	0.087	-0.086	-0.111	0.037
	(0.058)	(0.073)	(0.083)	(0.117)
Race: Hispanic	0.016	-0.144**	-0.164*	-0.025
	(0.048)	(0.069)	(0.092)	(0.090)
F-test on joint significance of Race	*0.854*	*1.993*	*1.957*	*0.170*
P-value	*0.467*	*0.119*	*0.125*	*0.917*
Some College	0.022	-0.033	-0.084	0.019
	(0.054)	(0.054)	(0.065)	(0.076)
College	0.065	-0.025	-0.082	-0.003
	(0.085)	(0.094)	(0.114)	(0.121)
F-test on joint significance of Education	*0.308*	*0.186*	*0.850*	*0.0518*
P-value	*0.736*	*0.830*	*0.430*	*0.950*
Wave 1 Picture Vocabulary Test Score	-0.002	-0.002	-0.001	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)
$19K=<Parental Income <$28K	-0.032	0.003	0.042	-0.096
	(0.090)	(0.095)	(0.121)	(0.137)
$28K=<Parental Income <$36K	0.032	0.102	0.146	0.032
	(0.082)	(0.103)	(0.121)	(0.132)
$36K=<Parental Income <$45K	0.086	0.077	0.125	0.099
	(0.095)	(0.097)	(0.122)	(0.147)
$45K=<Parental Income <$56K	0.097	0.060	0.065	0.074
	(0.080)	(0.090)	(0.110)	(0.123)
$56K=<Parental Income <$80K	0.157	0.120	0.082	0.199

	(0.101)	(0.115)	(0.138)	(0.145)
$80K=<Parental Income	0.195*	0.205	0.248	0.269
	(0.113)	(0.136)	(0.157)	(0.188)
F-test on joint significance of Parental Income	*1.237*	*0.574*	*0.597*	*1.289*
P-value	*0.293*	*0.750*	*0.732*	*0.269*
Parents: Married	-0.129	-0.067	-0.044	-0.256*
	(0.086)	(0.152)	(0.183)	(0.151)
Parent: Divorced, Separated or Widowed	-0.108	-0.012	0.039	-0.225
	(0.090)	(0.158)	(0.188)	(0.154)
F-test on joint significance of Parental Marital Status	1.132	0.391	0.497	1.437
P-value	0.326	0.677	0.610	0.242
Mothers Education: High School	-0.012	-0.039	-0.081	-0.014
	(0.094)	(0.068)	(0.096)	(0.110)
Mothers Education: Above High School	-0.043	-0.015	-0.019	-0.000
	(0.086)	(0.079)	(0.109)	(0.123)
F-test on joint significance of Mother's Education	0.251	0.238	0.758	0.0248
P-value	0.779	0.789	0.471	0.976
Observations	482	482	364	295
R-squared	0.218	0.245	0.304	0.364
F-test on joint significance of all the variables	0.942	1.424	1.523	1.135
P-value	0.548	0.109	0.0721	0.320

Robust standard errors corrected for clustering on the school are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Notes: All models include controls for military-specific variables, including rank, branch of service, timing of service, and occupation. Regressions are estimated using data drawn from Waves I and IV of the National Longitudinal Study of Adolescent Health.

Table 3A: Estimates of the Relationship between Combat Exposure and Domestic Violence, Add Health Full Sample

VARIABLES	(1) Threaten	(2) Hit	(3) Injury
	Panel A: All		
Combat Service (Military Controls)	0.060***	0.050***	0.032**
	(0.022)	(0.016)	(0.013)
	[476]	[476]	[476]
Combat Service (Full Controls)	0.071***	0.050***	0.036**
	(0.024)	(0.018)	(0.016)
	[476]	[476]	[476]
Combat Service (Full Controls and	0.070***	0.050***	0.036**
Pre-deployment violence measures)	(0.024)	(0.018)	(0.016)
	[476]	[476]	[476]
	Panel B: All		
Combat Exposure	0.082***	0.057***	0.032**
	(0.028)	(0.018)	(0.015)
Combat Service without Exposure	0.060**	0.044*	0.039*
	(0.029)	(0.024)	(0.021)
	[476]	[476]	[476]
	Panel C: Army		
Combat Exposure	0.103*	0.104**	0.052
	(0.060)	(0.049)	(0.041)
Combat Service without Exposure	0.104*	0.072	0.055
	(0.056)	(0.047)	(0.043)
	[195]	[195]	[195]
	Panel D: Marines		
Combat Exposure	0.060	0.036	0.017
	(0.060)	(0.041)	(0.029)
Combat Service without Exposure	0.027	-0.017	0.060
	(0.102)	(0.078)	(0.046)
	[96]	[96]	[96]
	Panel E: Navy		
Combat Exposure	-0.030	-0.029	-0.032
	(0.100)	(0.092)	(0.057)
Combat Service without Exposure	-0.002	0.086	-0.003
	(0.090)	(0.067)	(0.047)
	[117]	[117]	[117]

Robust standard errors corrected for clustering on the school are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

All models use the full set of controls shown in Appendix Table 1 along with pre-deployment serious physical fight and physical maltreatment by parents prior to age 18. In all models, military rank, timing of military service, branch of service, and occupation indicators are controlled for. Models also include missing dummy categories for each of the control variables.

In every model estimated those who are deployed to a non-combat zone constitute the comparison group.

Table 3B: Estimates of the Relationship between Combat Exposure and Domestic Violence, Add Health

VARIABLES	(1) Threaten	(2) Hit	(3) Injury	(4) In a Relationship
	Panel A: All			
Combat Service	0.044*	0.036**	0.021	-0.083*
	(0.024)	(0.017)	(0.014)	(0.043)
	[401]	[401]	[401]	[476]
	Panel B: All			
Combat Exposure	0.060**	0.044**	0.020	-0.049
	(0.030)	(0.018)	(0.013)	(0.044)
Combat Service without Exposure	0.029	0.028	0.023	-0.112**
	(0.029)	(0.025)	(0.020)	(0.049)
	[401]	[401]	[401]	[476]
	Panel C: Army			
Combat Exposure	0.023	0.069	-0.001	-0.032
	(0.071)	(0.051)	(0.030)	(0.109)
Combat Service without Exposure	0.049	0.042	0.017	-0.154
	(0.050)	(0.045)	(0.036)	(0.106)
	[157]	[157]	[157]	[195]
	Panel D: Marines			
Combat Exposure	0.022	0.064	0.000	-0.193**
	(0.099)	(0.065)	(0.000)	(0.082)
Combat Service without Exposure	-0.060	-0.048	0.000	-0.049
	(0.086)	(0.045)	(0.000)	(0.128)
	[85]	[85]	[85]	[96]
	Panel E: Navy			
Combat Exposure	-0.018	-0.024	-0.058	-0.069
	(0.124)	(0.089)	(0.079)	(0.131)
Combat Service without Exposure	0.051	0.139*	-0.007	-0.194
	(0.120)	(0.074)	(0.062)	(0.135)
	[104]	[104]	[104]	[117]

Robust standard errors corrected for clustering on the school are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

All models use the full set of controls shown in Appendix Table 1 along with pre-deployment serious physical fight and physical maltreatment by parents prior to age 18. In all models, military rank, timing of military service, branch of service, and occupation indicators are controlled for. Models also include missing dummy categories for each of the control variables.

In every model estimated those who are deployed to a non-combat zone constitute the comparison group.

Table 4A: Estimates of the Relationship between Combat Exposure and Domestic Violence, DOD HRB Full Sample

VARIABLES	(1) Any Abuse	(2) Partner Abuse	(3) Child Abuse	(4) Relationship Stress	(5) Argument	(6) Break up
			Panel A: All			
Combat Exposure	0.010**	0.008*	0.010***	0.034***	0.057***	0.033***
	(0.004)	(0.004)	(0.004)	(0.008)	(0.011)	(0.011)
	[11,474]	[11,449]	[11,442]	[11,393]	[11,415]	[11,431]
			Panel B: Army			
Combat Exposure	0.013**	0.008	0.006*	0.049**	0.045	0.029
	(0.005)	(0.005)	(0.003)	(0.016)	(0.027)	(0.031)
	[2,548]	[2,543]	[2,537]	[2,529]	[2,533]	[2,533]
			Panel C: Marines			
Combat Exposure	0.006	0.006	0.009*	0.033	0.072***	0.027*
	(0.012)	(0.015)	(0.003)	(0.018)	(0.014)	(0.010)
	[2,494]	[2,486]	[2,485]	[2,473]	[2,482]	[2,488]
			Panel D: Navy			
Combat Exposure	0.022*	0.021*	0.024*	0.042*	0.077**	0.069**
	(0.011)	(0.009)	(0.011)	(0.021)	(0.031)	(0.028)
	[3,344]	[3,339]	[3,338]	[3,322]	[3,325]	[3,329]
			Panel E: Air F			
Combat Exposure	0.001	0.000	0.003	0.021*	0.035**	0.006
	(0.004)	(0.004)	(0.002)	(0.011)	(0.013)	(0.009)
	[3,088]	[3,081]	[3,082]	[3,069]	[3,075]	[3,081]

Robust standard errors corrected for clustering on the stratum are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All models use the full set of controls shown in Appendix Table 2 along.

Table 4B: Estimates of the Relationship between <u>Combat Exposure</u> and Domestic Violence, DOD HRB in a Relationship Sample

	(1) Any Abuse	(2) Partner Abuse	(3) Child Abuse	(4) Relationship Stress	(5) Argument	(6) Break up	(7) In a Rlsnship	(8) Living With Children	(9) Living With Children
Panel A: All									
Combat	0.010*	0.008	0.010**	0.033***	0.055***	0.030**	0.005	0.001	-0.003
Exposure	(0.005)	(0.005)	(0.004)	(0.010)	(0.011)	(0.012)	(0.009)	(0.009)	(0.010)
	[9,274]	[9,255]	[9,248]	[9,205]	[9,222]	[9,238]	[11,404]	[11,425]	[9,255]
Panel B: Army									
Combat	0.010	0.006	0.003	0.056	0.046	0.026	0.023	0.018	0.012
Exposure	(0.008)	(0.006)	(0.004)	(0.033)	(0.032)	(0.031)	(0.024)	(0.028)	(0.035)
	[2,096]	[2,092]	[2,087]	[2,079]	[2,082]	[2,083]	[2,533]	[2,533]	[2,090]
Panel C: Marines									
Combat	0.005	0.003	0.010	0.023	0.063**	0.018	0.026	0.020	0.012
Exposure	(0.013)	(0.015)	(0.006)	(0.018)	(0.022)	(0.014)	(0.020)	(0.028)	(0.030)
	[2,014]	[2,010]	[2,008]	[1,995]	[2,004]	[2,010]	[2,483]	[2,487]	[2,013]
Panel D: Navy									
Combat	0.022	0.022	0.023	0.041	0.073*	0.067*	-0.002	-0.019	-0.025
Exposure	(0.013)	(0.012)	(0.012)	(0.022)	(0.030)	(0.031)	(0.020)	(0.016)	(0.014)
	[2,648]	[2,643]	[2,642]	[2,632]	[2,631]	[2,634]	[3,329]	[3,336]	[2,643]
Panel D: Air Force									
Combat	0.002	0.002	0.003	0.017	0.035**	0.007	-0.006	0.002	0.002
Exposure	(0.005)	(0.005)	(0.004)	(0.012)	(0.010)	(0.014)	(0.009)	(0.014)	(0.013)
	[2,516]	[2,510]	[2,511]	[2,499]	[2,505]	[2,511]	[3,059]	[3,069]	[2,509]

Robust standard errors corrected for clustering on the stratum are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All models use the full set of controls shown in Appendix Table 2 along.

Table 5: Evidence on Matching on Observables in DOD HRB Survey

	All	All	All	Army	Army	Army	Marines	Marines	Marines	Navy	Navy	Navy	Air Force	Air Force	Air Force
	Combat	Non-Combat	p-value	Combat	Non-Combat	p-value	Combat	Non-Combat	p-value	Combat	Non-Combat	p-value	Combat	Non-Combat	p-value
Located in the Contiguous US (CONUS)	0.71	0.76	0.02	0.63	0.67	0.15	0.91	0.91	0.82	0.76	0.78	0.44	0.70	0.66	0.17
Rank E4-E6	0.54	0.55	0.99	0.65	0.61	0.48	0.53	0.50	0.56	0.60	0.60	0.96	0.57	0.61	0.44
Rank E7-E9	0.18	0.15	0.10	0.11	0.11	1.00	0.13	0.12	0.68	0.17	0.16	0.82	0.16	0.17	0.61
Rank W1-W5	0.03	0.04	0.02	0.05	0.07	0.17	0.04	0.05	0.63	0.01	0.02	0.33	0.00	0.00	.
Rank O1-O3	0.10	0.10	0.74	0.09	0.12	0.64	0.13	0.13	0.91	0.09	0.09	0.92	0.10	0.07	0.08
Rank O4-O10	0.09	0.10	0.93	0.06	0.05	0.42	0.08	0.10	0.33	0.07	0.10	0.40	0.12	0.10	0.70
US Army Training and Doctrine Command*	0.01	0.02	0.21	0.14	0.12	0.75									
US Army Europe*	0.03	0.03	0.05	0.14	0.18	0.69									
US Army Pacific*	0.02	0.02	0.03	0.13	0.09	0.18									
8th Army*	0.03	0.03	0.97	0.11	0.07	0.20									
US Fleet Forces Command*	0.10	0.09	0.02							0.40	0.44	0.37			
Commander Pacific Forces*	0.05	0.05	0.39							0.25	0.22	0.34			
Naval Medical Command*	0.03	0.03	0.65							0.12	0.10	0.35			
Commander Naval Installations Command*	0.04	0.04	0.60							0.14	0.16	0.53			
Marine Corps Installations East*	0.13	0.15	0.06				0.66	0.66	0.69						
Marine Corps Installations West*	0.07	0.08	0.10				0.31	0.33	0.41						
Air Combat Command*	0.08	0.08	0.51										0.26	0.24	0.40
Air Education and Training Command*	0.03	0.02	0.08										0.10	0.06	0.18
Air Force Materiel Command*	0.04	0.03	0.41										0.09	0.08	0.57
Air Force Space Command*	0.04	0.03	0.13										0.07	0.08	0.43
Air Mobility Command*	0.08	0.07	0.24										0.22	0.23	0.70
Pacific Air Forces*	0.06	0.04	0.03										0.15	0.18	0.26
US Air Forces Europe*	0.03	0.03	0.59										0.09	0.10	0.34
Number of Deployments in lifetime	1.71	1.69	0.61	1.41	1.39	0.65	1.29	1.27	0.35	1.92	1.99	0.19	1.77	1.82	0.39
High School Education	0.22	0.23	0.75	0.25	0.19	0.72	0.44	0.41	0.64	0.26	0.25	0.79	0.11	0.12	0.64
Some College	0.49	0.48	0.39	0.47	0.50	0.52	0.34	0.34	0.79	0.48	0.49	0.94	0.60	0.65	0.35
College Degree or above	0.26	0.27	0.66	0.25	0.27	0.74	0.22	0.24	0.40	0.24	0.25	0.74	0.29	0.24	0.20
Age	31.93	31.43	0.08	30.93	30.59	0.69	28.23	28.72	0.38	31.58	31.89	0.67	32.13	31.70	0.60
Age Squared	1078.50	1046.60	0.11	1009.80	984.52	0.62	846.17	883.99	0.31	1050.10	1075.30	0.55	1086.10	1057.00	0.59
Race (Black)	0.16	0.13	0.15	0.23	0.18	0.44	0.08	0.06	0.37	0.17	0.15	0.84	0.10	0.08	0.51
Race (Other)	0.11	0.09	0.06	0.10	0.09	0.75	0.06	0.05	0.71	0.14	0.14	0.91	0.09	0.08	0.68

Notes: Nearest neighbor matching is employed using data drawn from the 2008 Department of Defense Health and Related Behaviors Survey
*- The following represent various major commands for the Army, Navy, Marines, and Air Force respectively.

Table 6A: Propensity Score Matching Estimates of Relationship between Combat Exposure and Domestic Abuse – DOD HRB SURVEY

	(1) All	(2) Army	(3) Marines	(4) Navy	(5) Air Force
Outcome					
Any Abuse	0.012**	0.011	0.022*	0.025**	0.002
	(0.005)	(0.015)	(0.013)	(0.011)	(0.009)
	[3,949]	[350]	[546]	[801]	[1,028]
Partner Abuse	0.009	(0.011)	0.011	0.019*	0.002
	(0.005)	(0.016)	(0.010)	(0.011)	(0.009)
	[3,949]	[350]	[546]	[801]	[1,028]
Child Abuse	0.012***	0.006	0.018*	0.029***	0.002
	(0.003)	(0.06)	(0.010)	(0.087)	(0.005)
	[3,949]	[350]	[546]	[801]	[1,028]
Relationship Stress	0.037***	0.069*	0.051	0.059**	0.036
	(0.012)	(0.041)	(0.036)	(0.026)	(0.028)
	[3,949]	[350]	[546]	[801]	[1,028]
Argument	0.069***	-0.017	0.096***	0.097**	0.057
	(0.018)	(0.059)	(0.032)	(0.040)	(0.038)
	[3,949]	[350]	[546]	[801]	[1,028]
Break up	0.038**	0.023	0.022	0.089***	0.009
	(0.017)	(0.047)	(0.029)	(0.030)	(0.028)
	[3,949]	[350]	[546]	[801]	[1,028]

Robust standard errors corrected for clustering on the school are in parentheses. In PSM estimates: bootstrapped standard errors are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All models use the full set of controls shown in Appendix Table 2.

Table 6B: Exploring Degree of Bias in HRB Survey Estimates using Add Health Data and Xs Available in Both Datasets

VARIABLES	(1) Threaten	(2) Hit	(3) Injury
Combat Service: OLS	0.062***	0.050***	0.035**
	(0.022)	(0.016)	(0.014)
	[476]	[476]	[476]
Combat Service: PSM	0.052*	0.041	0.031
	(0.031)	(0.025)	(0.022)
	[193]	[193]	[193]

In OLS estimates: standard errors corrected for clustering on the school are in parentheses. In PSM estimates: bootstrapped standard errors are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

All models control for age, age squared, race/ethnicity indicators, education indicators, military rank, timing of military service, and branch of service. Models also include missing dummy categories for each of the control variables.

In every model estimated those who are deployed to a non-combat zone constitute the comparison group.

Table 7A: Exploration of Whether Psychological Stress Mediates the Relationship Between Combat Exposure and Domestic Violence in HRB Survey

	(1)	(2)	(3)	(4)
Panel A: Any Domestic Abuse				
Combat Exposure	0.010**	0.007	0.006	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
PTSD		0.031***		0.021***
		(0.007)		(0.007)
Suicide		0.021*		0.018
		(0.012)		(0.012)
Psychological Stress		0.028***		0.025***
		(0.008)		(0.008)
Binge Drinking			0.010**	0.008**
			(0.004)	(0.004)
Drug Use			0.108***	0.097***
			(0.015)	(0.015)
	[11,474]	[11,474]	[11,474]	[11,474]
Panel B: Hitting Partner				
Combat Exposure	0.008*	0.005	0.005	0.003
	(0.004)	(0.004)	(0.004)	(0.004)
	[11,449]	[11,449]	[11,449]	[11,449]
Panel C: Hitting Children				
Combat Exposure	0.010***	0.008**	0.007**	0.006**
	(0.004)	(0.003)	(0.003)	(0.003)
	[11,442]	[11,442]	[11,442]	[11,442]
Panel D: High Stress Relationship				
Combat Exposure	0.034***	0.014*	0.029***	0.013
	(0.008)	(0.008)	(0.007)	(0.008)
	[11,393]	[11,393]	[11,393]	[11,393]
Panel E: Heated Argument				
Combat Exposure	0.057***	0.041***	0.051***	0.038***
	(0.011)	(0.010)	(0.011)	(0.010)
	[11,415]	[11,415]	[11,415]	[11,415]
Panel F: Partner Threatened to Leave				
Combat Exposure	0.033***	0.021**	0.027**	0.018*
	(0.011)	(0.010)	(0.010)	(0.010)
	[11,431]	[11,431]	[11,431]	[11,431]
Stress Controls	NO	**YES**	NO	**YES**
Substance Abuse Controls	NO	NO	**YES**	**YES**

Robust standard errors corrected for clustering on the stratum are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All models use the full set of controls shown in Appendix Table 2 along.

Table 7B: Exploration of Whether Psychological Stress Mediates the Relationship Between Combat Exposure and Domestic Violence in – Add Health

VARIABLES	(1) Threaten	(2) Threaten	(3) Hit	(4) Hit	(5) Injury	(6) Injury
Combat Exposure	0.082***	0.072**	0.057***	0.052***	0.032**	0.027**
	(0.028)	(0.028)	(0.018)	(0.017)	(0.015)	(0.013)
Combat Service without Exposure	0.060**	0.051*	0.044*	0.043*	0.039*	0.037*
	(0.029)	(0.028)	(0.024)	(0.024)	(0.021)	(0.021)
	[476]	[476]	[476]	[476]	[476]	[476]
Stressors and Substance Abuse Controls	NO	YES	NO	YES	NO	YES

Robust standard errors corrected for clustering on the school are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

All models use the full set of controls shown in Appendix Table 1 along with pre-deployment serious physical fight and physical maltreatment by parents prior to age 18. In all models, military rank, timing of military service, branch of service, and occupation indicators are controlled for. Models also include missing dummy categories for each of the control variables.

In every model estimated those who are deployed to a non-combat zone constitute the comparison group.

Table 8A: Sensitivity of Estimates to Use of Other Combat Exposure Measures in the HRB Survey

VARIABLES	(1) Any Abuse	(2) Any Abuse	(3) Partner Abuse	(4) Partner Abuse	(5) Child Abuse	(6) Child Abuse	(7) Relationship Stress	(8) Relationship Stress	(9) Argument	(10) Argument	(11) Break up	(12) Break up
ALL												
Killed	0.044***	0.033***	0.039***	0.029***	0.035***	0.026***	0.066***	0.019**	0.072***	0.030	0.070***	0.040***
Someone	(0.007)	(0.006)	(0.007)	(0.006)	(0.008)	(0.007)	(0.011)	(0.009)	(0.019)	(0.019)	(0.011)	(0.010)
	[11,317]	[11,317]	[11,292]	[11,292]	[11,285]	[11,285]	[11,242]	[11,242]	[11,258]	[11,258]	[11,274]	[11,274]
Wounded or	0.090***	0.071***	0.081***	0.063***	0.082***	0.068***	0.075***	0.000	0.074***	0.010	0.096***	0.044*
Injured	(0.021)	(0.019)	(0.020)	(0.018)	(0.020)	(0.018)	(0.014)	(0.013)	(0.018)	(0.016)	(0.022)	(0.022)
	[11,338]	[11,338]	[11,314]	[11,314]	[11,307]	[11,307]	[11,264]	[11,264]	[11,283]	[11,283]	[11,296]	[11,296]
Witnessed	0.024***	0.015**	0.021***	0.012**	0.022***	0.015***	0.052***	0.012	0.056***	0.020	0.044***	0.017
Death of Ally	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)	(0.011)	(0.010)	(0.015)	(0.015)	(0.012)	(0.012)
	[11,391]	[11,391]	[11,368]	[11,368]	[11,361]	[11,361]	[11,314]	[11,314]	[11,333]	[11,333]	[11,350]	[11,350]
Mediating Channels	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Panel B: Army												
Killed	0.034**	0.027**	0.032**	0.025**	0.016*	0.011	0.081***	0.034*	0.052*	0.016	0.067**	0.047**
Someone	(0.009)	(0.008)	(0.011)	(0.009)	(0.007)	(0.007)	(0.017)	(0.015)	(0.021)	(0.022)	(0.019)	(0.017)
	[2,487]	[2,487]	[2,482]	[2,482]	[2,476]	[2,476]	[2,469]	[2,469]	[2,472]	[2,472]	[2,472]	[2,472]
Wounded or	0.056*	0.046	0.053*	0.043	0.037*	0.032	0.074**	0.018	0.062	0.016	0.063*	0.035
Injured	(0.026)	(0.025)	(0.026)	(0.023)	(0.018)	(0.017)	(0.024)	(0.015)	(0.031)	(0.027)	(0.026)	(0.029)
	[2,504]	[2,504]	[2,499]	[2,499]	[2,493]	[2,493]	[2,487]	[2,487]	[2,490]	[2,490]	[2,489]	[2,489]
Witnessed	0.019*	0.012	0.016	0.009	0.008	0.004	0.066**	0.028	0.021	-0.010	0.055	0.037
Death of Ally	(0.009)	(0.009)	(0.008)	(0.008)	(0.006)	(0.005)	(0.022)	(0.018)	(0.021)	(0.022)	(0.028)	(0.026)
	[2,520]	[2,520]	[2,516]	[2,516]	[2,510]	[2,510]	[2,503]	[2,503]	[2,505]	[2,505]	[2,506]	[2,506]
Mediating Channels	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Panel C: Marines												
Killed	0.039***	0.025**	0.030**	0.018	0.033**	0.022**	0.058*	0.009	0.064	0.021	0.056**	0.022
Someone	(0.007)	(0.006)	(0.009)	(0.009)	(0.008)	(0.007)	(0.021)	(0.019)	(0.056)	(0.055)	(0.013)	(0.011)
	[2,453]	[2,453]	[2,445]	[2,445]	[2,444]	[2,444]	[2,433]	[2,433]	[2,441]	[2,441]	[2,447]	[2,447]
Wounded or	0.117*	0.088	0.087	0.063	0.117*	0.092*	0.099**	-0.002	0.089**	0.017	0.098	0.024

48

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Injured	(0.048)	(0.043)	(0.046)	(0.040)	(0.043)	(0.038)	(0.027)	(0.032)	(0.020)	(0.035)	(0.057)	(0.063)
	[2,473]	[2,473]	[2,465]	[2,465]	[2,464]	[2,464]	[2,454]	[2,454]	[2,462]	[2,462]	[2,467]	[2,467]
Witnessed Death of Ally	0.015	0.002	0.013	0.002	0.019*	0.008	0.019	-0.027	0.047	0.011	0.017	-0.017*
	(0.010)	(0.010)	(0.011)	(0.011)	(0.007)	(0.006)	(0.019)	(0.017)	(0.037)	(0.033)	(0.008)	(0.007)
	[2,472]	[2,472]	[2,464]	[2,464]	[2,463]	[2,463]	[2,452]	[2,452]	[2,460]	[2,460]	[2,466]	[2,466]
Mediating Channels	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Panel D: Navy												
Killed Someone	0.095**	0.073**	0.083***	0.064**	0.095**	0.076**	0.057**	-0.002	0.089**	0.042	0.119**	0.074**
	(0.029)	(0.026)	(0.021)	(0.018)	(0.032)	(0.029)	(0.018)	(0.014)	(0.029)	(0.036)	(0.034)	(0.029)
	[3,319]	[3,319]	[3,314]	[3,314]	[3,313]	[3,313]	[3,298]	[3,298]	[3,300]	[3,300]	[3,304]	[3,304]
Wounded or Injured	0.128**	0.105**	0.124**	0.103**	0.129**	0.108**	0.052	-0.045	0.048	-0.031	0.178**	0.114*
	(0.039)	(0.032)	(0.044)	(0.037)	(0.036)	(0.030)	(0.038)	(0.032)	(0.043)	(0.036)	(0.067)	(0.058)
	[3,301]	[3,301]	[3,296]	[3,296]	[3,295]	[3,295]	[3,280]	[3,280]	[3,283]	[3,283]	[3,286]	[3,286]
Witnessed Death of Ally	0.051**	0.038**	0.046**	0.035**	0.054**	0.043**	0.029	-0.014	0.099**	0.063	0.075**	0.044
	(0.016)	(0.014)	(0.015)	(0.013)	(0.018)	(0.015)	(0.017)	(0.015)	(0.036)	(0.036)	(0.030)	(0.026)
	[3,327]	[3,327]	[3,322]	[3,322]	[3,321]	[3,321]	[3,306]	[3,306]	[3,308]	[3,308]	[3,312]	[3,312]
Mediating Channels	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Panel E: Air Force												
Killed Someone	0.036**	0.030**	0.034**	0.028**	0.034**	0.031**	0.046	0.010	0.064**	0.029	0.036	0.012
	(0.012)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.034)	(0.027)	(0.019)	(0.030)	(0.028)	(0.031)
	[3,058]	[3,058]	[3,051]	[3,051]	[3,052]	[3,052]	[3,042]	[3,042]	[3,045]	[3,045]	[3,051]	[3,051]
Wounded or Injured	0.108**	0.096**	0.113**	0.099**	0.116**	0.108**	0.025	-0.040	0.011	-0.056	0.055	0.004
	(0.039)	(0.035)	(0.039)	(0.035)	(0.041)	(0.038)	(0.048)	(0.054)	(0.070)	(0.071)	(0.049)	(0.046)
	[3,060]	[3,060]	[3,054]	[3,054]	[3,055]	[3,055]	[3,043]	[3,043]	[3,048]	[3,048]	[3,054]	[3,054]
Witnessed Death of Ally	0.022**	0.015*	0.018**	0.011	0.024***	0.020***	0.095***	0.059**	0.057*	0.021	0.017	-0.009
	(0.008)	(0.007)	(0.007)	(0.006)	(0.005)	(0.004)	(0.026)	(0.020)	(0.030)	(0.034)	(0.026)	(0.023)
	[3,072]	[3,072]	[3,066]	[3,066]	[3,067]	[3,067]	[3,053]	[3,053]	[3,060]	[3,060]	[3,066]	[3,066]
Mediating Channels	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors corrected for clustering on the stratum are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All models use the full set of controls shown in Appendix Table 2.

Table 8B: Sensitivity of Estimates to Use of Other Combat Exposure Measures in the Add Health

VARIABLES	(1) Threaten	(2) Threaten	(3) Hit	(4) Hit	(5) Injury	(6) Injury
			Panel A: Killed			
Combat Service + Killed	0.088***	0.077***	0.066***	0.053***	0.034**	0.026*
	(0.031)	(0.029)	(0.020)	(0.020)	(0.015)	(0.014)
Combat Service without Exposure	0.059**	0.051*	0.040*	0.031	0.037*	0.034*
	(0.028)	(0.026)	(0.023)	(0.023)	(0.020)	(0.020)
	[476]	[476]	[476]	[476]	[476]	[476]
Stressors and Substance Abuse Controls	NO	YES	NO	YES	NO	YES
			Panel B: Wounded			
Combat Service + Wounded	-0.009	-0.022	0.010	-0.016	0.003	-0.000
	(0.033)	(0.037)	(0.022)	(0.031)	(0.017)	(0.020)
Combat Service without Exposure	0.078***	0.066***	0.054***	0.042**	0.039**	0.034*
	(0.026)	(0.024)	(0.019)	(0.020)	(0.017)	(0.017)
	[476]	[476]	[476]	[476]	[476]	[476]
Stressors and Substance Abuse Controls	NO	YES	NO	YES	NO	YES
			Panel C: Ally Dead			
Combat Service + Saw Ally Dead	0.068**	0.062*	0.049**	0.036	0.025	0.020
	(0.029)	(0.032)	(0.022)	(0.026)	(0.017)	(0.021)
Combat Service without Exposure	0.071**	0.059**	0.051**	0.040*	0.045**	0.040**
	(0.029)	(0.027)	(0.023)	(0.022)	(0.020)	(0.019)
	[476]	[476]	[476]	[476]	[476]	[476]
Stressors and Substance Abuse Controls	NO	YES	NO	YES	NO	YES

Robust standard errors corrected for clustering on the school are in parentheses. Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

All models use the full set of controls shown in Appendix Table 1 along with pre-deployment serious physical fight and physical maltreatment by parents prior to age 18. In all models, military rank, timing of military service, branch of service, and occupation indicators are controlled for. Models also include missing dummy categories for each of the control variables.

In every model estimated those who are deployed to a non-combat zone constitute the comparison group.

Appendix Table 1: Means of Alternate Combat Measures and Control Variables in Add Health Data

Variable	All	Combat Service	Combat Exposure	Non-Combat Exposure	Non-Combat Service
Killed or Believed Killed Another	0.295	0.390	0.735	0.064	0.000
	(0.456)	(0.488)	(0.443)	(0.246)	0.000
Wounded or Injured in Combat	0.089	0.118	0.181	0.059	0.000
	(0.285)	(0.323)	(0.386)	(0.236)	0.000
Saw Coalition or Ally Killed, Dead, or Wounded	0.392	0.519	0.718	0.332	0.000
	(0.489)	(0.500)	(0.452)	(0.472)	0.000
PTSD	0.119	0.154	0.250	0.064	0.009
	(0.324)	(0.362)	(0.434)	(0.246)	(0.092)
Suicide Ideation	0.064	0.069	0.107	0.032	0.051
	(0.246)	(0.253)	(0.310)	(0.177)	(0.221)
Psychological Stress	4.243	4.418	4.599	4.246	3.703
	(2.992)	(3.042)	(3.090)	(2.993)	(2.775)
Bing Drink last 30d	0.232	0.232	0.253	0.212	0.231
	(0.422)	(0.423)	(0.436)	(0.410)	(0.423)
Drug Use last 30d	0.154	0.157	0.192	0.123	0.144
	(0.361)	(0.364)	(0.395)	(0.329)	(0.353)
Height in Inches	70.324	70.275	70.475	70.086	70.475
	(3.207)	(3.286)	(3.339)	(3.232)	(2.958)
Weight in Pounds	194.006	192.201	190.859	193.471	199.576
	(35.258)	(34.591)	(34.231)	(34.972)	(36.835)
Missing Data: Weight in Pounds	0.002	0.003	0.006	0.000	0.000
	(0.046)	(0.052)	(0.075)	0.000	0.000
Religion: Protestant	0.313	0.324	0.356	0.294	0.280
	(0.464)	(0.469)	(0.480)	(0.457)	(0.451)
Religion: Catholic	0.241	0.253	0.232	0.273	0.203
	(0.428)	(0.435)	(0.423)	(0.447)	(0.404)
Religion: Other Christian	0.170	0.173	0.158	0.187	0.161
	(0.376)	(0.379)	(0.366)	(0.391)	(0.369)
Religion: Other	0.071	0.058	0.051	0.064	0.110
	(0.256)	(0.234)	(0.220)	(0.246)	(0.314)
Missing Data: Religion	0.002	0.000	0.000	0.000	0.009
	(0.046)	0.000	0.000	0.000	(0.092)
Age in Years	28.678	28.566	28.492	28.636	29.025
	(1.704)	(1.732)	(1.762)	(1.706)	(1.571)
Age in Years Squared	825.351	819.006	814.853	822.936	844.924
	(96.928)	(98.344)	(99.769)	(97.080)	(90.031)
Race: Black	0.220	0.217	0.186	0.246	0.229
	(0.415)	(0.413)	(0.391)	(0.432)	(0.422)
Race: Other	0.079	0.091	0.062	0.118	0.042
	(0.270)	(0.288)	(0.242)	(0.323)	(0.202)
Race: Hispanic	0.164	0.168	0.119	0.214	0.153
	(0.371)	(0.374)	(0.324)	(0.411)	(0.361)
Missing Data: Race	0.002	0.003	0.006	0.000	0.000
	(0.046)	(0.052)	(0.075)	0.000	0.000
Missing Data: Race - Hispanic	0.002	0.003	0.000	0.005	0.000
	(0.046)	(0.052)	0.000	(0.073)	0.000
Personal Earnings	44631.43	46065.74	44443.51	47600.27	40061.95
	(46523.83)	(51325.59)	(24559.42)	(67561.27)	(25496.60)
Missing Data: Personal Earnings	0.019	0.011	0.011	0.011	0.042
	(0.136)	(0.104)	(0.106)	(0.103)	(0.202)

Education: Some College	0.664	0.673	0.661	0.685	0.636
	(0.473)	(0.470)	(0.475)	(0.466)	(0.483)
Education: College	0.164	0.168	0.158	0.177	0.153
	(0.371)	(0.374)	(0.366)	(0.382)	(0.361)
Missing Data: Education	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000
No Health Insurance	0.120	0.104	0.124	0.086	0.170
	(0.326)	(0.306)	(0.331)	(0.281)	(0.377)
Missing Data: Health Insurance	0.012	0.014	0.017	0.011	0.009
	(0.111)	(0.117)	(0.129)	(0.103)	(0.092)
Wave 1 PVT Score	96.349	95.692	98.576	92.963	98.373
	(29.541)	(30.632)	(27.082)	(33.494)	(25.903)
Missing Data: Wave 1 PVT Score	0.071	0.077	0.051	0.102	0.051
	(0.256)	(0.267)	(0.220)	(0.303)	(0.221)
Parental Income <$19K	0.141	0.137	0.130	0.144	0.153
	(0.349)	(0.345)	(0.337)	(0.352)	(0.361)
$19K=<Parental Income <$28K	0.127	0.113	0.113	0.112	0.170
	(0.333)	(0.317)	(0.318)	(0.317)	(0.377)
$28K=<Parental Income <$36K	0.100	0.107	0.130	0.086	0.076
	(0.300)	(0.310)	(0.337)	(0.281)	(0.267)
$36K=<Parental Income <$45K	0.116	0.118	0.107	0.128	0.110
	(0.321)	(0.323)	(0.310)	(0.335)	(0.314)
$45K=<Parental Income <$56K	0.141	0.146	0.147	0.144	0.127
	(0.349)	(0.353)	(0.355)	(0.352)	(0.335)
$56K=<Parental Income <$80K	0.083	0.091	0.079	0.102	0.059
	(0.276)	(0.288)	(0.271)	(0.303)	(0.237)
$80K=<Parental Income	0.050	0.055	0.062	0.048	0.034
	(0.218)	(0.228)	(0.242)	(0.215)	(0.182)
Missing Data: Parental Income	0.243	0.234	0.232	0.235	0.271
	(0.429)	(0.424)	(0.423)	(0.425)	(0.447)
Parent is Married	0.647	0.648	0.633	0.663	0.644
	(0.478)	(0.478)	(0.483)	(0.474)	(0.481)
Parent is Divorced, Separated or Widowed	0.185	0.184	0.198	0.171	0.186
	(0.388)	(0.388)	(0.399)	(0.378)	(0.391)
Missing Data: Parents' Marital Status	0.135	0.126	0.130	0.123	0.161
	(0.342)	(0.333)	(0.337)	(0.329)	(0.369)
Mothers Education: Less than High School	0.118	0.110	0.107	0.112	0.144
	(0.323)	(0.313)	(0.310)	(0.317)	(0.353)
Mothers Education: High School	0.326	0.319	0.299	0.337	0.348
	(0.469)	(0.467)	(0.459)	(0.474)	(0.478)
Mothers Education: Above High School	0.456	0.459	0.486	0.433	0.449
	(0.499)	(0.499)	(0.501)	(0.497)	(0.500)
Missing Data: Mother's Education	0.100	0.113	0.107	0.118	0.059
	(0.300)	(0.317)	(0.310)	(0.323)	(0.237)
Currently in the Military	0.407	0.456	0.424	0.487	0.254
	(0.492)	(0.499)	(0.496)	(0.501)	(0.437)
Months Served in the Military	68.907	72.071	71.062	73.027	59.144
	(33.285)	(33.998)	(33.259)	(34.744)	(29.005)
Rank: Specialist/Corporal	0.326	0.302	0.299	0.305	0.398
	(0.469)	(0.460)	(0.459)	(0.462)	(0.492)
Rank: Sergeant	0.373	0.393	0.401	0.385	0.314
	(0.484)	(0.489)	(0.492)	(0.488)	(0.466)
Rank: Staff Sergeant	0.152	0.168	0.175	0.160	0.102
	(0.359)	(0.374)	(0.381)	(0.368)	(0.304)
Rank: First Class Sergeant or Higher	0.091	0.104	0.107	0.102	0.051
	(0.288)	(0.306)	(0.310)	(0.303)	(0.221)

Army	0.411	0.440	0.537	0.348	0.322
	(0.493)	(0.497)	(0.500)	(0.478)	(0.469)
Service Exclusively in After-September 11	0.241	0.267	0.294	0.241	0.161
	(0.428)	(0.443)	(0.457)	(0.429)	(0.369)
Observations	482	364	177	187	118

Notes: The means are generated using drawn from the first and fourth waves of the National Longitudinal Study of Adolescent Health.

Appendix Table 2: Means of Alternate Combat Measures and Control Variables in DOD HRB Survey

Variable	All	Combat Exposure	Non-Combat Exposure
Killed Someone	0.156	0.296	0.009

	(0.363)	(0.457)	(0.096)
Wounded or Injured	0.052	0.099	0.002
	(0.221)	(0.298)	(0.042)
Witnessed Death of Ally	0.227	0.427	0.017
	(0.419)	(0.495)	(0.129)
Stress	0.121	0.139	0.102
	(0.326)	(0.346)	(0.303)
PTSD	0.095	0.130	0.059
	(0.294)	(0.336)	(0.235)
Suicide	0.041	0.045	0.035
	(0.197)	(0.208)	(0.184)
Binge Drinking	0.487	0.506	0.465
	(0.500)	(0.500)	(0.499)
Drug Use	0.042	0.057	0.026
	(0.201)	(0.233)	(0.160)
CONUS	0.684	0.756	0.608
	(0.465)	(0.430)	(0.488)
Rank E4-E6	0.526	0.504	0.550
	(0.499)	(0.500)	(0.498)
Rank E7-E9	0.167	0.167	0.167
	(0.373)	(0.373)	(0.373)
Rank W1-W5	0.040	0.056	0.022
	(0.195)	(0.229)	(0.148)
Rank O1-O3	0.098	0.100	0.096
	(0.297)	(0.300)	(0.294)
Rank O4-O10	0.096	0.112	0.079
	(0.294)	(0.315)	(0.269)
Number of Deployments	1.661	1.946	1.358
	(1.205)	(1.065)	(1.269)
High School Education	0.231	0.224	0.239
	(0.422)	(0.417)	(0.427)
Some College	0.475	0.467	0.484
	(0.499)	(0.499)	(0.500)
College Degree and Above	0.268	0.280	0.255
	(0.443)	(0.449)	(0.436)
Age	31.609	31.794	31.412
	(7.626)	(7.540)	(7.713)
Age Squared	1057.270	1067.721	1046.157
	(505.945)	(501.581)	(510.354)
Black	0.153	0.142	0.165
	(0.360)	(0.349)	(0.372)
Asian	0.053	0.036	0.072
	(0.224)	(0.185)	(0.258)
Race Other	0.115	0.101	0.131
	(0.319)	(0.301)	(0.337)
Married	0.675	0.689	0.660
	(0.468)	(0.463)	(0.474)
Divorced	0.090	0.099	0.081
	(0.286)	(0.298)	(0.272)
Observations	11542	5948	5594

Notes: The means are generated using drawn from the 2008 Department of Defense Health and Related Behaviors Survey.

Appendix Table 3. Matching of Control Variables for Add Health Sample – Full Sample

	Combat	No Combat	p-value
Months in the military	67.898	70.837	0.439
Specialist/Corporal	0.367	0.293	0.215
Sergeant	0.383	0.413	0.518
Staff Sergeant	0.133	0.174	0.534
1st Class Sergeant or >	0.102	0.109	0.740
Army	0.508	0.489	0.911
Marine Corps	0.250	0.359	0.041
Navy	0.133	0.098	0.196
Air Force	0.133	0.076	0.071
Service after 9/11	0.258	0.283	0.660
Currently Active Duty	0.414	0.457	0.752
Age in Years	28.555	28.750	0.666
Age in Years Squared	818.050	829.140	0.662
Black	0.180	0.196	0.902
Other Race	0.078	0.065	0.456
Hispanic	0.156	0.141	0.375
Some College	0.641	0.620	0.751
College	0.180	0.207	0.754

Notes: Nearest neighbor matching is employed using data drawn from the Add Health.