

**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 war service in the Global War on Terrorism (GWOT) on domestic violence. We exploit a natural experiment in overseas deployment assignment among active duty servicemen by relying on theoretical and empirical evidence that, conditional on military rank and occupation, deployment assignments are orthogonal to the propensity for violence. Our results show that assignment to combat substantially increases the probability of intimate partner violence and child abuse. These findings are robust to controls for pre-deployment violence. Descriptive evidence suggests that the effects may be explained, in part, by the stress- and substance use-related consequences of war.

Keywords: combat exposure, domestic violence, relationship quality, post-traumatic stress disorder

1. Introduction

A wide body of literature in economics has examined the health and human capital costs of war on servicemembers (Angrist 1998, 1990, Angrist et al. 2010; Angrist et al. 2011; Angrist and Chen 2011; Cesur, Sabia and Tekin 2013). Relatively less attention has been paid to the effects of war on servicemembers' partners, children, and communities (Angrist and Johnson 2000; Lyle 2006; Rohlfs 2010; Negrusa et al. 2014). This study is the first to estimate the effect of war service on domestic violence.

Between 2.5 and nearly 5.0 million physical assaults are perpetrated against women by their intimate partners each year (Rand and Rennison 2005). Domestic abuse may arise (i) if men use violence as a mechanism to control their families, or (ii) as an unintended consequence of verbal arguments combined with stress and negative emotional shocks (Card and Dahl 2011). External stress may, therefore, be an important trigger for domestic violence.

Because of the substantial occupational stress that accompanies military service, families of servicemen have been identified by policymakers as a vulnerable population in need of protection. In 1981, the Department of Defense (DOD) implemented DOD Directive 6400.1, which requires each branch of the U.S. Armed Forces to implement:

(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. 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)¹

¹ During the course of a domestic violence investigation, the commander may order an accused serviceman to move from the household and into military barracks. A military protective order, similar to a restraining order in civilian court, may also be granted to the alleged victim. Child abuse cases mandate involvement of local civilian child protective services organizations in the investigation as well. See Sadusky (2010) for a detailed discussion.

The consequences for the commission of domestic violence by servicemen can range from family counseling to Court-Martial under Articles 120 (Rape), 128 (Assault), or 134 (Threat of Harm) of the Uniform Code of Military Justice, which could lead to discharge. Federal law also provides for taxpayer-funded financial protection to spouses and dependent children of servicemen who are discharged for domestic violence.² While official US military policy treats domestic violence as a serious offense, there is at least some concern that military families are counseled to tolerate violence from returning veterans.³

This study exploits a natural experiment in overseas deployment assignment among active duty military personnel in the Global War on Terrorism (GWOT) to identify the effect of combat service on relationship health, intimate partner violence, and child abuse. We find that combat assignments are associated with a substantial decline in relationship health and an increased risk of domestic violence. Descriptive evidence suggests that these effects may be explained, in part, by the 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), 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

² The authorized payment to abused spouses is \$850 per month for up to a maximum of 36 months, with an additional \$215 for each dependent child.

³ To take an example, a July 2004 report in the *New Yorker* gave this account from an Army wife:

“When he was coming home, the Army gave us little cards that said things like ‘Watch for psychotic episodes’ and ‘Is he drinking too much?’” she said. “A lot of wives said it was a joke. They had a lady come from the psych ward, who said—and I’m serious—‘Don’t call us unless your husband is waking you up in the middle of the night with a knife at your throat.’ Or, ‘Don’t call us unless he actually chokes you, unless you pass out. He’ll have flashbacks. It’s normal.’” (*New Yorker*, 7/12/04)

have been beaten by an intimate partner. In addition, child maltreatment is the leading cause of injury-related death among children who are older than one year (Institute of Medicine 1999). State and local child protective services report that an estimated 695,000 children were victims of child maltreatment in 2010 (CDC 2012a). 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 for survivors and foregone lifetime earnings of those killed—have been estimated to exceed \$5.8 annually (CDC 2003).⁴

2.2 Theoretical Mechanisms. Sociologists and psychologists have offered a number of theoretical explanations for domestic violence. General strain theory suggests that presence of strain leads to negative affective states, including anxiety, fear, and anger, which in turn leads to violence that is intended to minimize or eliminate the source of strain (Agnew 1992). Empirical evidence suggests that negative emotional cues (Card and Dahl 2011), including occupation-induced stress (Gibson et al. 2001), are associated with increased risk of domestic violence.

A number of studies by public health researchers (Hoge et al., 2006, 2004; Erbes et al., 2008; Rosenheck and Fontana, 2007; Seal et al., 2007; Tanielian and Jaycox, 2008) and 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 (PTSD), a potentially important mechanism through which combat service could affect domestic violence.

In addition to the direct effects of stress-related ailments on domestic violence, the substance use effects of combat could also influence violence. Those drafted to war service in World War II, Korea, and Vietnam (Price et al., 2004; McFall et al., 1992) or deployed to combat in GWOT (Chesney et al. 2013; Thomsen et al., 2011; Jacobson et al., 2008) have been found to be more likely to use drugs or alcohol, each of which has been linked to increased

⁴ Sabia et al. (2013) and Rees and Sabia (2013) document adverse schooling and earnings effects of sexual violence.

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).⁵

Normalization to violence may be yet another pathway through which combat service could affect domestic violence (Schwab-Stone et al., 1995). There is some evidence that combat exposure—as well as combat training itself—may permanently break down the mind’s natural barriers to committing violent acts (Grossman 2009; Grossman and Siddle 1999).⁶

Combat service may also affect effect on the distribution of potential mates available to the servicemen. A well-established assortative mating literature documents that partners share similar traits and come from comparable socioeconomic classes (Belot and Francesconi, 2013), and combat service may affect the distribution of women who form relationships with servicemen, which may affect the quality of matches and the probability of violence.

Finally, war deployments may themselves affect domestic violence. While, the absence of a potentially violent spouse from the household may reduce the likelihood of domestic violence, his return may bring a new set of stresses to the household, which could trigger violence. Moreover, the length of deployments and number of deployments may generate family stress that increases the risk of domestic violence.

2.3 Selection. While the above mechanisms represent plausible causal channels through which military service may affect domestic violence, military service also may be related to domestic violence through selection. Men who select into military service differ on a wide set of

⁵ Identification of substance use effects has generally come from policy variation in beer taxes or via cross-regional variation in drug prices.

⁶ 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.

characteristics from civilians (Dobkin and Shabani 2009) and many of these characteristics—such as socioeconomic status (Segal et al., 1998; Bachman et al., 2000; Kleykamp, 2006), physical and mental health (see DOD Directives 6130.3 and 6130.4), and personality—are also related to the likelihood of domestic violence commission (Aizer 2010; Angelucci 2008; Dugan, Nagin, and Rosenfeld. 1999). Women who choose to partner with and have children with servicemen may also differ from partners and children of civilians (Larsen et al., 2011), and victims of violence may be non-randomly targeted (Sabia, Dills, and DeSimone 2013).⁷

2.3 Literature. While no study in the economics literature has explored the effect of war service on domestic violence, several studies have estimated the effect of military service on violent crime more broadly (Rohlf's 2010; Galiani, Rossi, and Schargrodsy 2011; Lindo and Stroecker 2014; Bouffard 2003; Anderson and Rees Forthcoming). Several provide evidence in support of the hypothesis that combat service is associated with increases in violent crime.

A handful of studies have explored the relationship between military service and relationship quality. Heerwig and Conley (2013) find that Vietnam War service adversely affects residential stability; Angrist and Johnson (2000) find that deployments of female, but not male, soldiers to the Persian Gulf War had no effect on divorce; and Negrusa, Negrusa, and Hosek (2014) and Negrusa and Negrusa (2014) find that post-9/11 deployments adversely affect marital stability, with combat-induced PTSD as an important contributing factor.

Prior research that has studied intimate partner violence or child abuse in families of military servicemen has been descriptive in nature, often examining small convenience samples. Studies have either (i) focused on military populations and estimated the prevalence of domestic violence (Taft et al. 2005; Marshall, Panuzio, and Taft 2005; Forgey, and Badger, 2006; Defense

⁷ Reservists and National Guardsmen also differ from active-duty servicemembers on characteristics that could also be related to family violence and relationship health (Hirsch and Mehay, 2003).

Task Force on Domestic Violence, 2003; Campbell et al. 2003; Sayers, Farrow, Ross, and Oslin 2009), or (ii) compared domestic violence rates of military and civilian families (Griffin and Morgan 1988; Cronin 1995; Heyman and Neidig 1999). These latter studies have generally found that spousal abuse is more common in military than civilian families (Griffin and Morgan 1988; Cronin 1995; Heyman and Neidig 1999), but the results on child abuse is more mixed (Gessner and Runyan 1995; North Carolina Child Advocacy Institute 2004; Raiha and Soma 1997; McCarroll et al. 2008; Dubanoski and McIntosh 1984). However, none of these studies has disentangled the causal effect of war on domestic abuse from an association due to selection.

3. Identification

In our empirical analysis, identification is based on the fact that individual servicemen are 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, made by Human Resources Command, are based on two exogenous factors: operational needs of the U.S. military, 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, (within branch) as essentially perfect substitutes when making unit deployment decisions. Conditional on rank and occupational characteristics of units, deployment assignments are made independently of servicemen's family background, home 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—branch-specific military rank and occupation—available to it when deployment decisions are made.

The credibility of our natural experiment rests upon the assumption that, conditional on the small set of military observables described above, deployment assignments are exogenous to domestic violence. Recent studies have convincingly argued that deployment assignments are exogenous to servicemen’s individual and family characteristics (Cesur et al. 2013; Lyle 2006; Engel et al. 2010), an assumption we descriptively test below.

Note that our approach identifies the effect of assigning servicemen of identical rank and occupation to combat versus non-combat deployments. This local average treatment effect (LATE) may differ from that generated from a draft lottery, which estimates the effect of randomly drawing a civilian into war service. While both LATEs are informative, the lack of political support for reinstatement of the military draft suggests that our estimates will provide an important policy-relevant parameter.

Moreover, because identification comes from deployment assignment among deployed active duty servicemen, we do not identify the effect of deployment per se, but rather the effect of combat versus non-combat deployments. Thus, the theoretical channels described above related to the effect of deployment relative to non-deployment will not explain our findings.⁸ Finally, while servicemen can affect the probability of deployment by their occupation choice, our identification approach relies on conditional randomization; that is, *within-occupation* and *military rank*, deployment assignment is exogenous to relationship health and domestic violence.

⁸While short-run timing of deployments may be plausibly exogenous (Lyle 2006), long-term non-deployed servicemen may, in fact, be “non-deployable” for reasons related to health (Department of the Army AR 614-30, 2010), which could be related to family violence.

4. Data and Measures

Our analysis uses two datasets: the National Longitudinal Study of Adolescent Health (Add Health) and the Department of Defense Health and Related Behaviors (HRB) Survey. 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. 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 (1995-96, 2001-02, 2007-08). Our analysis focuses on the Third Follow-Up Survey (Wave IV) when respondents were ages 24 to 34.

At Wave IV, there were 753 men who reported current or prior active duty service in the U.S. military, 80 percent of whom served in GWOT (post-9/11). Our analysis sample is comprised of 476 active duty male soldiers who reported overseas deployment and provided non-missing information on domestic violence. Our key measure of combat in the Add Health, *Combat Service*, is an indicator is equal to 1 for respondents who reported assignment to a combat zone and set equal to 0 for those deployed overseas to a non-combat zone.⁹ In the Add Health sample, 76.1 percent of those deployed overseas were assigned to combat zones (N = 362), while the remainder (N = 114) were assigned to non-combat zones. We also experiment with an alternate measure of combat, *Combat Exposure*, which measures whether the respondent “engaged the enemy in firefight.” Among those who were deployed, 37 percent report combat exposure.

⁹ 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>

We measure domestic violence and relationship health in the Add Health using information gathered from servicemen at Wave IV. Each measure is dichotomous in nature and measures violence in dating-like relationships as well as cohabiting and married couples. Our first outcome, *Threaten*, measures whether the serviceman reports he has “threatened [his] partner with violence, pushed or shoved her, or thrown something at her that could hurt” in the most recent year of the relationship.¹⁰ Our second, *Hit*, measures whether the respondent has “slapped, hit, or kicked [his] partner.” The final domestic violence outcome, *Injury*, measures whether the respondent’s partner “had an injury such as a sprain, bruise, or cut because of a fight with [him].” We provide means in Table 1. Among deployed servicemen, 5.7 percent report threatening, pushing, or throwing something at their partner, 3.2 percent reported having slapped, hit, or kicked their partner, and 1.7 percent report injuring their partner.

Finally, we constructed two broader measures of relationship health: *Trust*, which measures whether the Add Health respondent strongly agreed or agreed that he “trusts [his] partner to be faithful” and *Listen*, which measures whether the respondent strongly agreed or agreed that his “partner listens to [him] when [he] need[s] someone to talk to.” Among deployed servicemen, 78.9 percent report trust in their partner’s faithfulness and 81.5 percent report that their partner listens to them.

While the Add Health survey is administered using the Computer Assisted Personal Interview (CASI) to minimize underreporting of sensitive or even illegal behaviors, this method

¹⁰ The reference partner was decided by the survey administrators 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.”

does not necessarily eliminate underreporting of the true prevalence of intimate partner violence (Rathod et al. 2011; Maineri and Danziger 2001). However, the means reported in the Add Health are not dissimilar from other data sources. For instance, 2.0 to 13.0 percent of Army veterans reported intimate partner violence in an alternate national sample (Heyman and Neidig 1999). Moreover, even if our measures understate the prevalence of violence, as long as underreporting rates are orthogonal to combat assignment, our estimates (in terms of percent changes in the dependent variable) should remain unbiased.

Our identification assumption rests on the premise that, conditional on military observables, combat assignment is exogenously determined. The key advantage to using the Add Health is that it contains information on each of the observables available to Human Resources Command when making deployment decisions. Moreover, because the data are longitudinal in nature, we can explore whether deployment assignment is related to a wide set of family and individual background characteristics, including pre-deployment violence. The disadvantage of the Add Health is its relatively small military sample, which reduces precision of estimates, as well as its generalizability given that it focuses only on young adults ages 24 to 34.

In an effort to address these issues, we turn to the HRB Survey, which was collected by Research Triangle International 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. The survey was completed via anonymous surveys distributed at military installations to respondents ages 18 to 50. When weighted, the survey is designed to be representative of US servicemembers in all pay grades serving throughout the globe.¹¹ Our main sample consists of 11,474 active duty servicemen (2548 soldiers, 3,344 sailors, 2,494 marines,

¹¹ See Bray et al. 2009 for more detailed information on the DOD HRB data collection strategy. Note that 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.

and 3,088 airmen) who had been deployed overseas and provided non-missing information on combat exposure and domestic violence. An important advantage of the HRB data, therefore, is a much larger, representative sample.

The HRB survey did not ask respondents whether they had been deployed to a combat zone. However, it did ask analogous information on *Combat Exposure*, measured as whether the respondent reports “incoming fire from small arms, artillery, rockers or mortars” or having their “unit fire on the enemy.” Slightly more than 50 percent of reported combat exposure (Table 1).

The HRB Survey asked two separate questions pertaining to domestic abuse that allow us to generate three measures of violence. *Any Abuse* measures whether each serviceman “hit [his] spouse, live-in fiancé, boyfriend or girlfriend, or the person [he] dates[s]” (*Partner Abuse*) or “hit [his] children for a reason other than discipline (spanking)” in the last year (*Child Abuse*). We find that 2.3 percent reported some form of domestic violence, with 1.7 reporting intimate partner abuse, and 1.3 percent child abuse. These percentages are lower than those reported in the Add Health for two reasons: first, the average age of HRB respondents is about 3 years older than in the Add Health and violence reports are lower among older servicemen; second, the 2008 HRB survey was a pencil and paper survey that often took place in large communal halls with less confidentiality afforded than the CASI system. HRB reports of intimate partner violence were on the lower end of the range reported by Heyman and Neidig (1999) as were child abuse rates (US National Survey of Children’s Exposure to Violence).¹²

With regard to relationship health, *Break-Up* measures whether the respondent reports that his “spouse or live-in fiancé/ boyfriend/girlfriend threatened to leave or left [him]” in the last year; Relationship stress (*Stress*) is measured as whether the respondent reports having

¹² Approximately 3.7 percent of those ages 0 to 17 reported physical abuse by caregiver (US National Survey of Children’s Exposure to Violence 2011)

experienced serious stress “in [his] family life or in a relationship with [his] spouse, live-in fiancé, boyfriend or girlfriend, or the person [he] date[s] seriously” over the last twelve months; and *Argument* measures whether the respondent had “heated arguments with family or friends” in the last year. The means of these outcomes, as well key controls appear in Table 1.

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. However, the HRB Survey does contain detailed information on military installation assignment (Major Command) and educational attainment, which could be important proxies for occupation. Below, we test the degree of bias introduced in the HRB data by the lack of occupation data by comparing “clean estimates” from the Add Health to estimates from the Add Health using only HRB controls.

Empirical Approach. To descriptively explore the exogeneity of deployment assignment, we begin by drawing data from the Add Health, and estimate:

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

where \mathbf{X} is a vector of individual and family background characteristics generally measured prior to deployment (age, race, education, parental income, parental marital status, maternal education, family structure, religion, number of siblings and children) as well as pre-deployment measures of violence, including serious physical fight experiences and parental physical maltreatment prior to age 18, as well as pre-deployment relationship status; and \mathbf{M} is a set of military controls, including rank, occupation, branch, and timing of service. If deployment assignment is

exogenous to domestic violence and relationship health, then, conditional on military characteristics, background variables should be unrelated to deployment assignment. The findings in Table 2 support this hypothesis. We find no evidence that individual or family background characteristics, including pre-deployment propensity for violence, predicts deployment assignment.¹³

Next, to identify the effects of combat assignment on domestic violence using both the Add Health and HRB survey, we estimate:

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

The key parameter of interest, δ_1 , is the effect of combat assignment on domestic violence. We focus on this estimate in Tables 3 through 9, with heteroskedasticity-corrected standard errors in parentheses and sample sizes in brackets. We use linear probability models for our regressions, though the marginal effects from probit models produce a similar pattern of findings.

5.1 Main Results

Add Health Findings. Table 3 presents our findings using the Add Health. Row (1) of Panel A presents estimates of δ_1 , conditioning only on military observables. Columns (1)-(3) show that assignment to a combat zone as compared to a non-combat zone increases the probability of subsequent domestic violence by 3.2 to 6.0 percentage-points. Relative to the means of these outcomes, these increases are quite large. We also find that a combat zone assignment is associated with a (statistically insignificant) 6.2 percentage-point decline in the

¹³ Specifically, column (1) compares respondents assigned to combat zones to those assigned to non-combat zones; column (2) compares respondents assigned to combat zones with enemy firefight to those assigned to non-combat zones; column (3) compares respondents assigned to combat zones with firefight to those assigned to either combat zones without firefight or to non-combat zones; and column (4) compares respondents assigned to combat zones without enemy firefight to those assigned to non-combat zones. Only being Hispanic seems related to deployment assignment, which we control for in all models. Robustness checks on a non-Hispanic white sample of males produce a similar pattern of results to those produced below.

probability of trust in fidelity and an 8.9 percentage-point decline in the probability of effective listening. The inclusion of controls for family and individual background characteristics (row 2) and pre-deployment violence (row 3) has little effect on the magnitude of the estimate of δ_1 , lending support to the hypothesis that deployment assignment is exogenous to personal characteristics.

In Panel B, we allow for differential effects of *Combat Service* depending on whether the combat zone assignment was accompanied by exposure to enemy firefight (*Combat Exposure*). The findings in Panel B suggest that assignment to a combat zone—regardless of whether the serviceman saw enemy firefight—is associated with substantial increases in the risk of intimate partner violence and reduced relationship quality. In no case can we reject the hypothesis that the effects are statistically equivalent for those assigned to combat zones with firefight and those assigned to combat zones where such firefight does not materialize.¹⁴

The results reported in Panels A and B could be biased if combat assignment affects relationship formation in such a way that those who remain in a relationship are more or less likely to commit domestic violence. For instance, if those that break up prior to deployment are more likely to be affected by combat assignments, our estimates could be biased downward. While we cannot easily disentangle these selection effects, our findings suggest that combat service is associated with a statistically insignificant change in the probability of being in a relationship (Appendix Table 1, Panel I, column 1) and, *conditional on being in a relationship* (Panel C, Table 3), with an increase in the probability of domestic violence (columns 1-3) and a decline in relationship health (columns 4-5). The magnitudes of estimated domestic violence and

¹⁴ Branch-specific estimates suggest the largest effects for those soldiers and marines.

relationship health effects of combat for the sample comprised of those in a relationship are statistically equivalent to the estimated effects for the full sample.¹⁵

Before turning to our HRB results, we first assess the degree of bias introduced to our estimates due to the lack of information on military occupation. To judge the magnitude of this bias, we first use the Add Health data and limit the set of observables in \mathbf{M} and \mathbf{X} from equation (2) to the set of controls available in both datasets. Assuming that the natural experiment is “clean” in the Add Health, a comparison of estimates of δ_1 from a regression that includes the full set of Add Health observables (Table 3, Panel B) and one that includes only the HRB available subset of controls (Panel D) should allow us to gauge the direction and magnitude of the bias. This comparison suggests that the absence of occupation data in the HRB does not substantially bias our estimates, perhaps because controls for educational attainment, military rank, and experience proxy reasonably well for occupation.

HRB Findings. Table 4 presents results from the HRB survey. The findings in Panel A show consistent evidence that combat exposure is associated with an increase in the risk of domestic violence and with diminished relationship quality. We find that assignment to a combat zone with enemy firefight is associated with a 1.0 percentage-point increase in the probability of domestic violence, a 0.8 percent increase in the probability of intimate partner violence, and a 1.0 percentage-point increase in child abuse. These estimates are approximately half the size observed in the Add Health (in percentage terms). This may be because in the Add Health, the comparison group is composed of respondents deployed to non-combat zones, while in the HRB survey, the comparison group is composed of respondents deployed to non-combat zones *or* to combat zones without enemy firefight. Thus, one explanation for this pattern of

¹⁵ When we restrict the sample to those in a relationship and repeat the exogeneity tests in Table 2, we find a similar pattern of results.

results is that deployment to a combat zone appears to have a substantial effect on domestic violence independent of whether the respondent was actually involved in combat (Table 3).¹⁶

Turning to relationship health (columns 4-6), we also find that combat exposure is associated with a 3.4 percentage-point increase in the probability of serious relationship stress, a 3.3 percentage-point increase in the probability of a relationship break-up (or threat thereof), and a 5.8 percentage-point increase in the probability of heated arguments.

When we exploit the HRB's larger branch-specific samples, we find larger domestic violence effects for the soldiers (Panel B), marines (Panel C), and sailors (Panel D) relative to airmen (Panel E). This finding, which is consistent with prior research suggesting smaller health effects of combat for airmen as compared to soldiers, marines, or sailors (see, for example, Cesur et al. 2013), may be explained by more distant exposure to combat or by differences in selection into different branches of the Armed Forces.

While we find no evidence that combat assignment is related to relationship formation or having children (Appendix Table 1, Panel I, columns 2 and 3), we find that conditional on being in a relationship (Panel F, Table 4) combat exposure is associated with increases in the risk of domestic violence (column 1), particularly of children (column 3), and diminished relationship quality (columns 4-6).¹⁷

5.2 Robustness of Findings

¹⁶ Another explanation might be heterogeneity in the effects of combat by age across the datasets. When we restrict the datasets to active duty individuals of the same age, the magnitudes are somewhat more similar, but still remain larger in the Add Health.

¹⁷ While we have information on domestic violence of any children of the respondent, we can only measure whether the respondent had children living in the household.

In order to examine whether the estimates presented above are sensitive to our definition of combat, we experimented with alternate measures available comparably in both the Add Health and HRB surveys. Specifically, respondents were asked whether they (i) believed they had killed anyone or had actually killed someone in battle, (ii) were wounded or injured themselves in battle, and (iii) had observed an ally killed or wounded.¹⁸ We use responses to these items to create alternate dichotomous measures of combat. Our findings, presented in Table 5, suggest that combat increases subsequent domestic violence and diminishes relationship quality across alternate combat measures.

Next, we explore whether combat exposure has heterogeneous effects on domestic violence for different sub-groups. We use data from the HRB survey, which has larger samples of these groups. The results in Panels A and B of Table 6 suggest that the domestic violence and relationship health effects of combat exposure among enlisted personnel (Panel A) are much larger than for officers (Panel B), consistent with Lyle (2006) who finds the effects of deployments on families are larger for enlisted personnel.¹⁹ Although unearthing the factors behind the differential effects of combat exposure among enlisted personnel versus officers is beyond the scope of this study, explanations for this result include endogenous determinants of becoming an officer, the consequences of serving as an officer, and characteristics of those who partner with enlisted personnel versus officers that may make them more likely to be victimized.

¹⁸ 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?*”, and “*During your combat deployment, did you see [coalition or ally] wounded, killed, or dead?*” Among deployed active duty male personnel, 29.5 percent reported believing they had killed or had actually killed someone, 8.9 percent reported being wounded or injured in battle, and 39.2 percent 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,’ and ‘I witnessed members of my unit or an ally unit being seriously wounded or killed.’*” In the HRB sample, 15.6 percent reported being responsible for death or serious injury of enemy, 5.2 percent reported being wounded in battle, and 39.2 percent reported witnessing members of their unit or an ally wounded or killed.

¹⁹ When we repeat the exogeneity tests of Table 2 on enlisted individuals, we find a similar pattern of results.

In Panel C, we examine the violence effects of combat deployment of *women*. There are a number of theoretical reasons to expect that the effect of combat on women may differ. Physical differences between the sexes make physical violence a less effective strategy for women to control men (Ptacek, Smith, and Dodge 1994; Tamres et al. 2004). There is also evidence that men and women respond to and cope with stressful situations differently (Wang et al., 2007; Matud 2004). Finally, combat exposure for women is likely to differ substantially from that experienced by men because of pre-2013 U.S. military policy that banned women from combat roles. Thus, females' exposure is likely to be confined to observing the consequences of combat rather than personal battlefield experience.²⁰ The results in Panel C suggest consistent evidence that combat exposure is significantly negatively related to our three measures of relationship health (columns 4-6). However, while the effects of combat exposure on domestic violence were uniformly positive, the effect sizes are much smaller in magnitude than those found for males and are statistically indistinguishable from zero.²¹

5.3 Mechanisms

The existing literature suggests several mechanisms through which combat assignment may affect domestic violence and relationship quality, including psychological stressors, substance abuse, and normalization of violence. Both datasets used in the analysis provide information on psychological stressors (PTSD, suicidal ideation, and stress scales) and substance abuse (drug use and binge drinking). In Table 7, we estimate the effect of combat assignment on

²⁰ In the HRB sample, we estimate that 38.1 percent of deployed females were assigned to combat zones were exposed to combat and 3 percent reported intimate partner violence.

²¹ In unreported results available upon request, we explore whether there are heterogeneous effects of combat assignment across several proxies for social support, including religiosity, education, and parental resources. The results of this descriptive exercise did not uncover evidence of differing combat effects across these measures.

these outcomes and find that assignment to combat leads to an increased probability of PTSD, psychological stress, and suicidal ideation, (Cesur, Sabia, and Tekin 2013).

In Table 8, we descriptively explore how each of these measures mediates the relationship between combat assignment and domestic violence (or relationship health). In the HRB data (Panel A), we find that controlling for PTSD, suicide ideation, and anxiety disorders²² reduces the magnitude of the association between *Combat Exposure* and *Any Abuse* (Panel A) by approximately 30 percent, while binge drinking and drug use also explain approximately 30 percent of the association. Together, the estimated association between combat assignment and domestic violence falls approximately 50 percent after controlling for substance use and stress-related ailments. In Panel B, we conduct the same exercise using the outcome of relationship stress and find that the inclusion of these controls reduces the estimated association by about two-thirds.

In Panels C and D, we repeat the exercise using the Add Health data. While we do find that the magnitude of the estimated association between combat and domestic violence falls with the inclusion of stress and substance use as right hand-side variables, 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

²² Specifically, 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* is a scale generated from questions that asked how often respondents 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 to 24 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. *Suicidal Ideation* is an indicator set equal to one if the respondent reported “seriously considering suicide” in the past year.

Drug Use is an indicator for whether the respondent used illicit drugs in the past 30 days; *Binge Drinking* is an indicator set equal to one if the respondent reported drinking five or more drinks in one occasion in the past 30 days.

effect. One explanation is that the stress disorder measure available in the HRB data is more detailed relative to the measure available in the Add Health.²³ Another might be because the channels are more important for those who have experienced combat service more recently while on active duty. And, in fact, when we limit the analysis sample in both datasets to current active duty members who are in the age range of 24 to 32, our mediation analysis produces similar results across each dataset.

5.4 Multiple Deployments, Deployment Length, and Time Since Deployment

The results above provide compelling evidence that combat-induced stress increases the risk of domestic violence. As shown in Table 7, increased risk of death and injury—to oneself and others—may be important sources of stress. However, combat assignments may have been different from non-combat assignments along other dimensions, which could, in turn, have affected domestic violence. For example, those exposed to combat may have been deployed greater numbers of times or for longer durations. More time away from family could reduce opportunities for abuse or lead to additional relationship stresses.

While the HRB survey does not include information on deployment length for all prior deployments, the survey includes information on (i) months of deployment in the prior year (2007-2008), which coincides with the so-called surge strategy in Iraq, and (ii) total number of post-9/11 combat deployments and peacekeeping missions. In results available upon request, we find that those exposed to combat have been deployed, on average, for 1.3 additional months and one additional time compared to their non-combat deployed counterparts. This may be

²³ The PTSD variable in the Add Health data is generated as an indicator set equal to one if the respondent said that a “a doctor, nurse or other health care provider ever told you that you have or had: post-traumatic stress disorder or PTSD.” The Stress scale is generated as the Cohen Perceived Stress Scale (from 0 to 16).

explained, in part, by longer combat deployments during the surge, which reached up to 15 months.

In the first three columns of Table 9, we attempt to disentangle the effect of number of deployments from combat exposure. We find that number of combat deployments is positively related to domestic violence (Panel I, column 2), PTSD (Panel II, column 2), and relationship stress (Panel III, column 2). However, we also find that *Combat Exposure* and deployment length have independent effects on domestic abuse and stress (column 3). The final four columns examine the sample of individuals who were deployed during the surge in Iraq, when months of deployment are reported in our data. We find that longer deployment lengths (those greater than 6 months) are associated with increased risk of domestic violence and stress (column 5).²⁴ Again, however, we find that months of deployment and combat exposure are independently positively related to domestic abuse and stress (column 6). In column (7) of Panel I, we regress domestic violence on deployment assignment, number of post-9/11 deployments, and prior year deployment length. The results suggest that longer deployment times (in terms of number of deployments and deployment length) may be an important part of why combat assignments increase risk of stress-induced family violence.^{25,26}

²⁴ The Add Health provides information on lifetime deployment length, but only among those deployed to combat zones. While we find some evidence of a positive relationship between total combat deployment and domestic violence, the effect does not appear to be linear or an important mediator of the effect of combat exposure on domestic abuse.

²⁵ One concern with the above analysis is that *Combat Exposure* is not measured concurrently with the deployment measures. In the HRB data, we experimented with an alternate measure, *Combat Service*, which was available for the prior 12 months. The pattern of findings is qualitatively similar to that presented in Table 9.

²⁶ Given that the HRB data does not contain information on number of deployments prior to 9/11, we experiment with restricting our sample to those who reported a post-9/11 deployment and find a similar pattern of results. Finally, in unreported results, we also examine interactive effects of number of deployments and combat exposure. While the magnitude of the estimated effect of combat exposure on domestic violence appears larger for those with 2 or more deployments (as compared to one deployment), we cannot reject the null hypothesis that the effects of combat exposure on domestic violence and stress is statistically equivalent across number of deployments.

Finally, we explore whether the effect of combat differs by the time since deployment. The HRB survey allows us to measure whether combat service occurred in the prior year or more than one year ago while the Add Health measures current service and prior service, which can further be disaggregated by date of separation.²⁷ The pattern of results, shown in Panel II of Appendix Table 2, suggest that the adverse domestic violence effects of combat assignment do not appear to dissipate in the longer-run relative to the short run.

6. Conclusions

Researchers estimating the impact of war are increasingly focusing on effects not only to the servicemen, but also their families and children (Angrist and Johnson 2000; Lyle 2006; Engel et al. 2010). 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 in 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 and diminished relationship quality. Descriptive evidence suggests that combat-induced stress and substance use might explain some of the domestic violence effect we observe. Finally, we find that multiple deployments and longer deployment lengths may independently increase the risk of family violence.

There are a number of data-related limitations of our work. First, these data do not allow us to explore whether relationship formation or dissolution is influenced by the announcement of combat assignment. If deployment orders induce relationship dissolution prior to deployment (an “announcement effect,” this type of sample selection could bias domestic violence effects of

²⁷ This approach will also better ensure that time since deployment is comparable for combat and non-combat deployed servicemen.

combat. Second, as noted above, disentangling the effects of deployment duration and multiple deployments from combat exposure is made more difficult in the DOD HRB data due to incongruous timing of each of these measures. Third, our data on self-reported domestic violence fail to capture the full extent of family violence ongoing during GWOT. And finally, while our findings suggest that the domestic violence effects of combat may persist over time (see Appendix Table 1, Panel II), our data only permit us to crudely examine shorter- versus-longer run effects.

What do these estimates imply about the costs of combat-induced domestic violence? Our back of the envelope calculations suggest a lower bound estimate of approximately 23,200 cases of domestic violence incidences are caused by combat deployments: approximately 14,500 incidences among Army families and 8,700 cases among Navy families.²⁸ Arias and Corso (2005) estimate the identifiable costs of domestic violence injuries at \$948 per woman, which suggests roughly \$22 million in costs of combat-induced family violence among active duty deployed servicemen. However, the costs rise substantially if one includes child abuse costs, estimated at \$210,012 per surviving child (CDC 2012b).

Currently, most interventions to prevent domestic violence are spearheaded by the DOD's Family Advocacy Program (FAP), which is tasked not only with identifying and treating victims of domestic violence, as well as investigating, treating and recommending punishments for alleged perpetrators, but also with identifying families at risk for violence and intervening

²⁸ About 2.5 million servicemembers were deployed since 2001, 2.1 million of which were men. Using marginal effects obtained in Table 4, this suggests 14,560 [$1,040,000 \times 0.014$] additional cases for Army families and 8,690 [$395,000 \times 0.022$] additional cases for Navy families. Note, however, that this estimate is our lower-bound estimate, as the 2.1 million deployed figure accounts for those deployed to combat zones, not actually exposed to combat. If we were to use the Add Health estimates from Table 3, Panel A, row 3—which estimate the effect of combat zone deployments—we would obtain increases in intimate partner violence cases of 84,000 (0.04×2.1 million) to 147,000 (0.07×2.1 million) cases.

before such violence unfolds. Recent efforts in collaboration with the National Resource Center on Domestic Violence have focused on devoting resources to evidence-based interventions.

In October 2010, the U.S. Military launched “Domestic Violence Awareness Month,” to raise awareness of domestic violence problems in the Armed Forces and to provide early interventions to those in need. DOD highlighted a number of these programs:

“Fort Meade, Md...held...seminars on subjects ranging from couples communication to healthy versus unhealthy relationships and spousal rights. At Scott Air Force Base, Ill., the 375th Medical Group’s family advocacy office launched voluntary anger management workshops to teach attendees to understand their anger issues and deal with them in nondestructive ways. Meanwhile, Marine Corps Base Camp Pendleton, Calif., is spotlighting its successful Power Workshop. The program gives victims of domestic violence an opportunity to share how it has impacted their homes, and teaches participants how to defuse potentially violent domestic situations, and what to do if they escalate.” (DOD 2010)

The findings in our study suggest interventions that are successful in reducing domestic violence commission by combat veterans may result in substantial social benefits.²⁹

²⁹ Moreover, as domestic violence offenses are often unreported, there may be positive spillover effects for interventions that encourage victims—or potential future victims—to come forward (Carrel and Hoekstra 2012).

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Table 1. Means of Key Variables

Add Health Survey (N=476)		DOD HRB Survey (N=11,474)		
	Mean	(SD)	Mean	(SD)
<i>Dependent Variables</i>				
Threaten	0.057	(0.232)	Any Abuse	0.023 (0.149)
Hit	0.032	(0.175)	Partner Abuse	0.017 (0.131)
Injury	0.017	(0.129)	Child Abuse	0.013 (0.112)
Trust	0.789	(0.409)	Break up	0.164 (0.370)
Listen	0.815	(0.389)	Relationship Stress	0.310 (0.463)
Relationship	0.842	(0.365)	Argument	0.135 (0.342)
			Relationship	0.813 (0.390)
<i>Combat Assignment</i>				
Combat Service	0.761	(0.427)	Combat Exposure	0.516 (0.500)
Combat Exposure	0.370	(0.483)	Killed Someone	0.155 (0.362)
Combat Service w/o Exposure	0.391	(0.488)	Wounded or Injured	0.051 (0.220)
Killed Someone	0.296	(0.457)	Witnessed Death of Ally	0.227 (0.419)
Wounded or Injured	0.090	(0.287)		
Witnessed Death of Ally	0.395	(0.489)		
<i>Stress and Substance Use</i>				
PTSD Diagnosis	0.120	(0.325)	PTSD Screening	0.095 (0.293)
Psychological Stress Scale	4.252	(2.992)	Psychological Stress	0.121 (0.326)
Suicidal Ideation	0.061	(0.239)	Suicidal Ideation	0.040 (0.196)
Usual Binge Drinking	0.228	(0.420)	Any Binge Drinking	0.486 (0.500)
Drug Use	0.155	(0.363)	Drug Use	0.042 (0.201)
<i>Selected Controls</i>				
Army	0.410	(0.492)	Army	0.222 (0.416)
Marines	0.202	(0.402)	Marines	0.217 (0.412)
Navy	0.246	(0.431)	Navy	0.291 (0.454)
Air Force	0.162	(0.369)	Air Force	0.269 (0.444)
Rank E1-E3 ^a	0.058	(0.234)	Rank E1-E3	0.073 (0.261)
Rank E4-E6	0.852	(0.355)	Rank E4-E6	0.525 (0.499)
Rank E7-E9	0.019	(0.136)	Rank E7-E9	0.168 (0.373)
Rank W1-W5	0.006	(0.079)	Rank W1-W5	0.040 (0.195)
Rank O1-O3	0.064	(0.246)	Rank O1-O3	0.098 (0.297)
Rank O4-O10	0.000	0.000	Rank O4-O10	0.096 (0.295)
Age	28.668	(1.707)	Age	31.622 (7.624)
White	0.706	(0.456)	White	0.732 (0.443)
Black	0.216	(0.412)	Black	0.153 (0.360)
Other Race	0.076	(0.265)	Other Race	0.115 (0.319)
Hispanic	0.166	(0.372)	Hispanic	0.125 (0.331)
Some College	0.664	(0.473)	Some College	0.475 (0.499)
College and Above	0.162	(0.369)	College and Above	0.269 (0.443)

For the Add Health Survey, the means are generated using data for males drawn from Wave IV of the National Longitudinal Study of Adolescent Health. Branch of service are not mutually exclusive in the Add Health Data. For the DOD HRB Survey, the means are generated using data for males drawn from the 2008 Department of Defense Health and Related Behaviors Survey. Both samples are comprised men only.

^a The Add Health rank measures are further disaggregated in the regression analysis (i.e., Rank E1-E2, Rank E3, Rank E4, Rank E5, Rank E6, Rank E7-E8, Rank O1-O2, Rank O3, Rank W1-W2).

Table 2. Estimated Relationship between Background Characteristics and Deployment Assignment, Add Health

	(1) <i>Combat Service = 1</i> vs <i>Combat Service = 0</i>	(2) <i>Combat Exposure = 1</i> vs <i>Combat Exposure = 0</i>	(3) <i>Combat Exposure = 1</i> vs <i>Combat Service = 1 and Exposure = 0</i>	(4) <i>Combat Exposure = 1</i> vs <i>Combat Service = 0</i>
Pre-Deployment Serious Fight W1	0.010 (0.049)	0.029 (0.056)	0.021 (0.069)	0.050 (0.073)
Physical Maltreatment Before Age 18	0.028 (0.088)	0.104 (0.094)	0.126 (0.103)	0.024 (0.129)
Pre-Deployment Romantic Relationship Status	-0.012 (0.043)	0.034 (0.046)	0.057 (0.057)	-0.029 (0.064)
Wave 1 Height	0.003 (0.008)	0.006 (0.010)	0.003 (0.011)	0.011 (0.011)
Wave 1 Weight	-0.001 (0.001)	0.000 (0.001)	0.001 (0.001)	-0.001 (0.002)
Religion: Protestant	0.016 (0.066)	0.030 (0.068)	0.013 (0.088)	0.021 (0.087)
Religion: Catholic	0.009 (0.070)	0.002 (0.070)	0.011 (0.085)	-0.017 (0.091)
Religion: Other Christian	0.010 (0.071)	-0.036 (0.080)	-0.024 (0.092)	-0.095 (0.109)
Religion: Other	-0.110 (0.110)	-0.149 (0.115)	-0.139 (0.154)	-0.209 (0.151)
<i>F-test on joint significance of Religion</i>	<i>0.409</i>	<i>1.085</i>	<i>0.409</i>	<i>0.759</i>
<i>P-value</i>	<i>0.802</i>	<i>0.368</i>	<i>0.802</i>	<i>0.555</i>
Age in Years	0.160 (0.379)	-0.219 (0.461)	-0.460 (0.615)	0.267 (0.495)
Age in Years Squared	-0.003 (0.007)	0.003 (0.008)	0.008 (0.011)	-0.005 (0.009)
Race: Black	0.032 (0.059)	-0.073 (0.078)	-0.097 (0.099)	0.015 (0.096)
Race: Other	0.098* (0.059)	-0.069 (0.082)	-0.096 (0.093)	0.055 (0.129)
Race: Hispanic	-0.002 (0.054)	-0.151** (0.074)	-0.173* (0.093)	-0.045 (0.090)
<i>F-test on joint significance of Race</i>	<i>0.963</i>	<i>1.575</i>	<i>1.528</i>	<i>0.149</i>
<i>P-value</i>	<i>0.413</i>	<i>0.199</i>	<i>0.211</i>	<i>0.930</i>
Some College	-0.001 (0.056)	-0.033 (0.056)	-0.068 (0.069)	0.009 (0.085)
College	0.080 (0.085)	-0.007 (0.101)	-0.050 (0.135)	0.050 (0.146)
<i>F-test on joint significance of Education</i>	<i>0.640</i>	<i>0.198</i>	<i>0.500</i>	<i>0.0620</i>
<i>P-value</i>	<i>0.529</i>	<i>0.821</i>	<i>0.608</i>	<i>0.940</i>
No Health Insurance	-0.054	-0.016	0.054	-0.014

Wave 1 Picture Vocabulary Test Score	(0.077)	(0.077)	(0.089)	(0.108)
	-0.002	-0.002	-0.001	-0.004
	(0.002)	(0.002)	(0.002)	(0.003)
\$19K=<Parental Income <\$28K	-0.047	-0.025	0.042	-0.136
	(0.093)	(0.099)	(0.120)	(0.151)
\$28K=<Parental Income <\$36K	0.051	0.048	0.090	0.006
	(0.087)	(0.106)	(0.121)	(0.147)
\$36K=<Parental Income <\$45K	0.069	0.028	0.080	0.055
	(0.101)	(0.098)	(0.117)	(0.160)
\$45K=<Parental Income <\$56K	0.081	0.017	0.038	0.024
	(0.087)	(0.091)	(0.107)	(0.132)
\$56K=<Parental Income <\$83K	0.137	0.096	0.089	0.114
	(0.114)	(0.119)	(0.138)	(0.160)
\$83K=<Parental Income	0.151	0.153	0.260*	0.156
	(0.119)	(0.141)	(0.152)	(0.195)
<i>F-test on joint significance of Parental Income</i>	<i>0.915</i>	<i>0.355</i>	<i>0.531</i>	<i>0.635</i>
<i>P-value</i>	<i>0.487</i>	<i>0.906</i>	<i>0.783</i>	<i>0.702</i>
Parents: Married	-0.122	-0.047	-0.067	-0.162
	(0.097)	(0.143)	(0.173)	(0.164)
Parents: Divorced, Separated or Widowed	-0.102	0.014	0.026	-0.130
	(0.105)	(0.154)	(0.179)	(0.167)
<i>F-test on joint significance of Parent Marital Status</i>	<i>0.792</i>	<i>0.378</i>	<i>0.557</i>	<i>0.498</i>
<i>P-value</i>	<i>0.455</i>	<i>0.686</i>	<i>0.574</i>	<i>0.609</i>
Mothers Education: High School	-0.019	-0.048	-0.105	-0.030
	(0.099)	(0.074)	(0.105)	(0.110)
Mothers Education: Above High School	-0.040	-0.018	-0.040	0.007
	(0.093)	(0.081)	(0.117)	(0.126)
<i>F-test on joint significance of Mother's Education</i>	<i>0.131</i>	<i>0.282</i>	<i>0.900</i>	<i>0.137</i>
<i>P-value</i>	<i>0.877</i>	<i>0.755</i>	<i>0.410</i>	<i>0.872</i>
One sibling	0.036	0.097	0.210	0.050
	(0.111)	(0.168)	(0.202)	(0.172)
Two siblings	0.033	0.107	0.207	0.063
	(0.120)	(0.189)	(0.226)	(0.206)
Three siblings	0.006	0.082	0.194	-0.014
	(0.115)	(0.170)	(0.204)	(0.190)
Four siblings	-0.020	0.077	0.234	0.014
	(0.125)	(0.169)	(0.209)	(0.195)
Five or more siblings	-0.026	0.067	0.174	-0.017
	(0.108)	(0.160)	(0.197)	(0.182)
<i>F-test on joint significance of siblings</i>	<i>0.293</i>	<i>0.110</i>	<i>0.290</i>	<i>0.218</i>
<i>P-value</i>	<i>0.916</i>	<i>0.990</i>	<i>0.918</i>	<i>0.954</i>
One or two Children	-0.052	0.026	0.045	-0.013
	(0.039)	(0.055)	(0.064)	(0.071)
Three or More Children	-0.085	0.011	0.077	-0.090
	(0.077)	(0.101)	(0.125)	(0.108)

<i>F-test on joint significance of children</i>	<i>1.199</i>	<i>0.119</i>	<i>0.323</i>	<i>0.359</i>
<i>P-value</i>	<i>0.305</i>	<i>0.887</i>	<i>0.724</i>	<i>0.699</i>
Observations	476	476	362	290
<i>F-test all background characteristics</i>	<i>0.811</i>	<i>0.804</i>	<i>0.909</i>	<i>0.825</i>
<i>P-value</i>	<i>0.748</i>	<i>0.758</i>	<i>0.610</i>	<i>0.728</i>

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 binary indicators for current active duty military service status, total service length, military rank, branch of service, timing of service, and occupation. Models also include missing dummy categories for each of the control variables with missing information. The sample is comprised of men only.

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

	(1) Threaten	(2) Hit	(3) Injury	(4) Trust	(5) Listen
Panel A: Effect of Combat Service					
Combat Service (Military Controls)	0.060** (0.023) [476]	0.048*** (0.016) [476]	0.032** (0.013) [476]	-0.062 (0.044) [473]	-0.089** (0.041) [476]
Combat Service (Full Controls)	0.073*** (0.025) [476]	0.051*** (0.019) [476]	0.040** (0.017) [476]	-0.096** (0.044) [473]	-0.103** (0.041) [476]
Combat Service (Full Controls + Pre-Deployment Violence and Relationship Status Controls)	0.072*** (0.026) [476]	0.052*** (0.019) [476]	0.040** (0.017) [476]	-0.099** (0.045) [473]	-0.099** (0.042) [476]
Panel B: Effect of Combat Exposure					
Combat Exposure	0.080*** (0.030)	0.053*** (0.019)	0.034** (0.016)	-0.093* (0.053)	-0.113** (0.049)
Combat Service without Exposure	0.065** (0.030) [476]	0.051* (0.026) [476]	0.045** (0.022) [476]	-0.105** (0.047) [473]	-0.087* (0.049) [476]
Panel C: Effect of Combat for Servicemen who are in Current Relationship					
Combat Exposure	0.060* (0.031)	0.040** (0.019)	0.020 (0.014)	-0.108* (0.061)	-0.093 (0.058)
Combat Service without Exposure	0.032 (0.028) [401]	0.031 (0.026) [401]	0.027 (0.021) [401]	-0.095 (0.065) [400]	-0.065 (0.068) [401]
Panel D: Effect of Combat Using DOD HRB Survey Controls					
Combat Exposure	0.068*** (0.024)	0.049*** (0.016)	0.027** (0.012)	-0.039 (0.055)	-0.124*** (0.047)
Combat Service without Exposure	0.055** (0.025) [476]	0.048** (0.020) [476]	0.040** (0.018) [476]	-0.043 (0.048) [473]	-0.081* (0.044) [476]

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. *Military Controls* include binary indicators for current active duty military service status, total service length, military rank, branch of service, service exclusively after September 11, and occupation. Models also include missing dummy categories for each of the control variables with missing information. *Full Controls* include height, weight, religion indicators, age, age squared, race/ethnicity indicators, education dummies, health insurance status indicator, Wave 1 Picture Vocabulary Test Score, parental income dummies, parental marital status indicators, maternal education indicators, number of siblings dummies and number of children indicators. *Pre-deployment Violence and Relationship Status Controls* include serious physical fight, physical maltreatment before age 18, and Wave 1 relationship status. All models in Panels B, C, and D control for *Military*, *Full*, and *Pre-deployment Violence and Relationship Status* variables. The sample used in Panels A, B, and D is comprised of active duty deployed servicemen. The sample used in Panel C is comprised of active duty deployed servicemen who report a current relationship at the time of the Wave IV survey. Panel D is estimated with a limited set of control variables, which are age, race, education and military controls excluding occupation indicators, available in the DOD HRB data. In every model estimated those who are deployed to a non-combat zone constitute the comparison group. The sample is comprised of men only.

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

	(1) Any Abuse	(2) Partner Abuse	(3) Child Abuse	(4) Relationship Stress	(5) Argument	(6) Break up
Panel A: Pooled (All Branches)						
Combat Exposure	0.010** (0.004) [11,474]	0.008* (0.004) [11,449]	0.010*** (0.003) [11,442]	0.034*** (0.008) [11,393]	0.057*** (0.011) [11,415]	0.033*** (0.011) [11,431]
Panel B: Army						
Combat Exposure	0.014** (0.005) [2,548]	0.009 (0.005) [2,543]	0.006* (0.003) [2,537]	0.049** (0.016) [2,529]	0.045 (0.027) [2,533]	0.029 (0.031) [2,533]
Panel C: Marines						
Combat Exposure	0.006 (0.012) [2,494]	0.006 (0.015) [2,486]	0.009* (0.003) [2,485]	0.032 (0.018) [2,473]	0.071*** (0.014) [2,482]	0.027* (0.010) [2,488]
Panel D: Navy						
Combat Exposure	0.022* (0.011) [3,344]	0.020* (0.009) [3,339]	0.024* (0.011) [3,338]	0.042* (0.021) [3,322]	0.077** (0.031) [3,325]	0.069** (0.028) [3,329]
Panel E: Air Force						
Combat Exposure	0.001 (0.004) [3,088]	0.000 (0.004) [3,081]	0.003 (0.002) [3,082]	0.021* (0.011) [3,069]	0.035** (0.013) [3,075]	0.006 (0.009) [3,081]
Panel F: Servicemen in a Relationship						
Combat Exposure	0.010* (0.005) [9,274]	0.008 (0.005) [9,255]	0.010** (0.004) [9,248]	0.033*** (0.010) [9,205]	0.055*** (0.011) [9,222]	0.030** (0.012) [9,238]

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. Each model controls for military rank, branch specific major command indicators, number of combat deployments after September 11, education dummies, age, age squared and race/ethnicity dummies. The pooled model (Panel A) also includes controls for branch of service. The sample is comprised of men only. The sample used in Panel F is comprised of active duty deployed servicemen who report a current relationship at the time the interview.

Table 5: Sensitivity of Estimates to Alternate Definitions of Combat Exposure

Panel A: Add Health Survey						
	Threaten (1)	Hit (2)	Injury (3)	Trust (4)	Listen (5)	
<i>Killed</i>						
Killed Someone	0.090*** (0.033)	0.036** (0.017)	0.063*** (0.021)	-0.123** (0.053)	-0.138*** (0.052)	
Combat No Killing	0.060** (0.029)	0.042** (0.021)	0.045* (0.024)	-0.085* (0.048)	-0.076 (0.048)	
	[476]	[476]	[476]	[473]	[476]	
<i>Wounded</i>						
Wounded or Injured	-0.006 (0.037)	0.015 (0.025)	0.000 (0.019)	-0.120 (0.097)	-0.107 (0.076)	
Combat No Wounding	0.079*** (0.027)	0.055*** (0.021)	0.044** (0.019)	-0.097** (0.044)	-0.098** (0.043)	
	[476]	[476]	[476]	[473]	[476]	
<i>Witnessed D</i>						
Witnessed Death of Ally	0.067** (0.029)	0.050** (0.022)	0.029 (0.018)	-0.112** (0.056)	-0.111** (0.045)	
Combat Not Seen Ally Dead	0.075** (0.032)	0.053** (0.025)	0.049** (0.022)	-0.088* (0.047)	-0.089 (0.054)	
	[476]	[476]	[476]	[473]	[476]	
Panel B: DOD HRB Survey						
	Any Abuse (1)	Partner Abuse (2)	Child Abuse (3)	Relationship Stress (4)	Argument (5)	Break up (6)
Killed Someone	0.044*** (0.007)	0.039*** (0.007)	0.035*** (0.008)	0.066*** (0.011)	0.072*** (0.019)	0.070*** (0.011)
	[11,317]	[11,292]	[11,285]	[11,242]	[11,258]	[11,274]
Wounded or Injured	0.090*** (0.021)	0.081*** (0.020)	0.082*** (0.020)	0.075*** (0.014)	0.074*** (0.018)	0.096*** (0.022)
	[11,338]	[11,314]	[11,307]	[11,264]	[11,283]	[11,296]
Witnessed Death of Ally	0.024*** (0.006)	0.021*** (0.006)	0.022*** (0.006)	0.052*** (0.011)	0.056*** (0.015)	0.044*** (0.012)
	[11,391]	[11,368]	[11,361]	[11,314]	[11,333]	[11,350]

Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In Panel A: Robust standard errors corrected for clustering on the school are in parentheses and all models control for the full set of covariates specified in Panel B of Table 3. In Panel B: Robust standard errors corrected for clustering on the stratum are in parentheses and all models controls for the full set of covariates specified in Table 4, including branch of service. Both samples are comprised of men only.

Table 6: Exploring Heterogeneity in the Effects of Combat by Enlisted vs. Officer and Males vs. Females

	(1)	(2)	(3)	(4)	(5)	(6)
	Any Abuse	Partner Abuse	Child Abuse	Relationship Stress	Argument	Break up
Panel A: Enlisted						
Combat Exposure	0.013**	0.012**	0.012***	0.045***	0.059***	0.037**
	(0.005)	(0.005)	(0.004)	(0.010)	(0.015)	(0.014)
	[8,792]	[8,770]	[8,764]	[8,722]	[8,745]	[8,753]
Panel B: Officers						
Combat Exposure	-0.002	-0.004	0.002	-0.002	0.051**	0.015
	(0.003)	(0.003)	(0.003)	(0.009)	(0.020)	(0.010)
	[2,682]	[2,679]	[2,678]	[2,671]	[2,670]	[2,678]
Panel C: Women						
Combat Exposure	0.004	0.007	0.002	0.033*	0.079***	0.035***
	(0.010)	(0.008)	(0.007)	(0.017)	(0.018)	(0.011)
	[3,169]	[3,161]	[3,158]	[3,145]	[3,153]	[3,156]

Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors corrected for clustering on the stratum are in parentheses. All models controls for the full set of covariates specified in Table 4, including branch of service. The sample is comprised men only.

Table 7: Estimates of the Effect of Combat Exposure on Psychological Stress and Substance Use

	(1) PTSD	(2) Suicidal Ideation	(3) Psychological Stress	(4) Binge Drink	(5) Drug Use
Panel A: DOD HRB Survey					
<i>Sample</i>					
All	0.065*** (0.009) [11,366]	0.013** (0.005) [10,796]	0.040*** (0.008) [11,370]	0.033*** (0.011) [11,010]	0.029*** (0.006) [11,449]
Army	0.091*** (0.009) [2,533]	0.029* (0.012) [2,390]	0.058*** (0.005) [2,531]	0.082** (0.022) [2,448]	0.034* (0.014) [2,544]
Marines	0.086*** (0.018) [2,465]	0.003 (0.010) [2,336]	0.029* (0.011) [2,467]	0.016 (0.029) [2,406]	0.039*** (0.008) [2,486]
Navy	0.069** (0.026) [3,315]	0.020 (0.013) [3,142]	0.041* (0.018) [3,313]	0.037 (0.019) [3,189]	0.046** (0.013) [3,337]
Air Force	0.037*** (0.006) [3,053]	0.003 (0.008) [2,928]	0.042** (0.016) [3,059]	0.008 (0.014) [2,967]	0.010 (0.007) [3,082]
Panel B: Add Health Survey					
Combat Exposure	0.193*** (0.030)	0.051 (0.041)	1.193*** (0.402)	0.058 (0.058)	0.073 (0.057)
Combat Service without Exposure	0.068** (0.031)	-0.011 (0.036)	0.642* (0.366)	0.040 (0.065)	0.005 (0.048)
Observations	[475]	[476]	[476]	[476]	[476]

Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In Panel A: Robust standard errors corrected for clustering on the stratum are in parentheses and all models controls for the full set of covariates specified in Table 4, including branch of service. In Panel B: Robust standard errors corrected for clustering on the school are in parentheses and all models control for the full set of covariates specified in Panel B of Table 3, including branch of service. Both samples are comprised of men only.

Table 8: Exploration of Whether Psychological Stress and Substance Use Mediates the Relationship Between Combat Exposure and Domestic Violence, Stress

	(1)	(2)	(3)	(4)
Panel A: Any Domestic Abuse (HRB Survey)				
Combat Exposure	0.010** (0.004)	0.007 (0.004)	0.007 (0.004)	0.005 (0.004)
PTSD		0.031*** (0.007)		0.021*** (0.007)
Suicide		0.022* (0.012)		0.018 (0.012)
Psychological Stress		0.028*** (0.008)		0.025*** (0.008)
Binge Drinking			0.010** (0.004)	0.008** (0.004)
Drug Use			0.107*** (0.015)	0.096*** (0.015)
	[11,474]	[11,474]	[11,474]	[11,474]
Panel B: Relationship Stress (HRB Survey)				
Combat Exposure	0.034*** (0.008)	0.014* (0.008)	0.029*** (0.007)	0.013 (0.008)
	[11,393]	[11,393]	[11,393]	[11,393]
Panel C: Threaten (Add Health Survey)				
Combat Exposure	0.080*** (0.030)	0.072** (0.030)	0.077*** (0.029)	0.069** (0.029)
	0.065** (0.030)	0.058** (0.028)	0.063** (0.029)	0.056* (0.028)
	[476]	[476]	[476]	[476]
Panel D: Trust (Add Health Survey)				
Combat Exposure	-0.093* (0.053)	-0.070 (0.054)	-0.086 (0.052)	-0.068 (0.054)
Combat Service without Exposure	-0.105** (0.047)	-0.103** (0.048)	-0.104** (0.047)	-0.103** (0.048)
	[473]	[473]	[473]	[473]
Stress Controls?	NO	YES	NO	YES
Substance Abuse Controls?	NO	NO	YES	YES

Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In Panels A and B: Robust standard errors corrected for clustering on the stratum are in parentheses and all models controls for the full set of covariates specified in Table 4, including branch of service. In Panels C and D: Robust standard errors corrected for clustering on the school are in parentheses and all models control for the full set of covariates specified in Panel B of Table 3, including branch of service. Both samples are comprised of men only.

Table 9. Combat Effects of Deployment Assignment, Number of Deployments, and Deployment Length, HRB Survey

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Full Deployed Sample			Prior Year Deployed Sample			
<i>Panel I: Domestic Abuse</i>							
Combat Exposure	0.013*** (0.004)		0.010** (0.004)	0.013** (0.005)		0.012** (0.005)	0.009 (0.006)
Number of Post-9/11 Deployments		0.004*** (0.001)	0.003** (0.001)				0.004** (0.002)
Deployed 3-6 Months in Last Year					0.003 (0.006)	0.002 (0.006)	0.001 (0.005)
Deployed 7+ Months in Last Year					0.011** (0.004)	0.009** (0.004)	0.007 (0.004)
<i>Joint Significance F-test</i>			8.53			7.47	9.15
<i>F-test P-Value</i>			0.00			0.00	0.00
	[11,474]	[11,474]	[11,474]	[7,336]	[7,336]	[7,336]	[7,336]
<i>Panel II: PTSD</i>							
Combat Exposure	0.068*** (0.010)		0.065*** (0.009)	0.076*** (0.011)		0.073*** (0.010)	0.070*** (0.010)
Number of Post-9/11 Deployments		0.006*** (0.002)	0.003* (0.002)				0.004* (0.002)
Deployed 3-6 Months in Last Year					0.003 (0.008)	-0.003 (0.007)	-0.004 (0.008)
Deployed 7+ Months in Last Year					0.031*** (0.010)	0.018* (0.009)	0.016 (0.009)
<i>Joint Significance F-test</i>			26.37			17.25	13.64
<i>F-test P-Value</i>			0.00			0.00	0.00
	[11,366]	[11,366]	[11,366]	[7,261]	[7,261]	[7,261]	[7,261]
<i>Panel III: Relationship Stress</i>							
Combat Exposure	0.036*** (0.009)		0.035*** (0.008)	0.046*** (0.010)		0.041*** (0.011)	0.040*** (0.011)
Number of Post-9/11 Deployments		0.003 (0.002)	0.001 (0.002)				0.002 (0.002)
Deployed 3-6 Months in Last Year					0.004 (0.010)	0.001 (0.011)	-0.000 (0.011)
Deployed 7+ Months in Last Year					0.037*** (0.010)	0.030*** (0.011)	0.028** (0.010)
<i>Joint Significance F-test</i>			9.04			11.53	8.68
<i>F-test P-Value</i>			0.00			0.00	0.00
	[11,393]	[11,393]	[11,393]	[7,288]	[7,288]	[7,288]	[7,288]

Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors corrected for clustering on the stratum are in parentheses. All models controls for the full set of covariates specified in Table 4, including branch of service. The sample is comprised of men only.

**Appendix Table 1: Estimated Effect of Combat on Relationships, Children and Violence,
by Timing of Service**

	(1)	(2)	(3)	(4)	(5)	(6)
Panel I: Effect of Combat Exposure on Relationships, Children						
	<u>Add Health Survey</u>		<u>DOD HRB Survey</u>			
	Relationship	Relationship			Relationship	Living With Children
Combat Service	-0.068 (0.041)				0.005 (0.009)	0.001 (0.009)
Combat Exposure		-0.050 (0.042)				
Combat Service without Exposure		-0.084* (0.049)				
	[476]	[476]			[11,404]	[11,425]

Panel II: Effect of Combat Exposure on Domestic Violence, by Timing of Service

	<u>Add Health Survey: Dependent variable is <i>Threaten</i></u>				<u>DOD HRB Survey: Dependent variable is <i>Any Domestic Abuse</i></u>	
	<u>Sample</u>				<u>Sample</u>	
	Current Service	Separation >= 1 Year Ago	Separation 0 to < 3 Years Ago	Separation >=3 Years Ago	Deployment in Last Year	Deployment Prior to Last Year
Combat Exposure	0.118** (0.059)	0.125** (0.054)	0.114 (0.228)	0.112 (0.073)	0.014** (0.005)	0.012*** (0.004)
Combat Service without Exposure	0.111** (0.053)	0.044 (0.049)	0.086 (0.142)	0.063 (0.058)	[7,416]	[4,035]
	[193]	[254]	[95]	[187]		

Number of observations is in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In the Add Health Survey sample: Robust standard errors corrected for clustering on the school are in parentheses and all models control for the full set of covariates specified in Panel B of Table 3, including branch of service. In the DOD HRB Survey Sample: Robust standard errors corrected for clustering on the stratum are in parentheses and all models controls for the full set of covariates specified in Table 4, including branch of service. Both samples are comprised of men only.