The Effect of Fathers' Combat Exposure on the Family

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Abstract

Millions of soldiers deployed to combat zones are at risk of developing mental disorders, thereby putting their families at risk. We investigate the effects of fathers' combat exposure on family outcomes by linking classified Danish military records on the father's combat exposure in Afghanistan and Iraq with family register data. We find that combat exposure leads to higher divorce rates and a 13 percent decline in children's test scores. Combat exposure affects fathers' mental health (substance abuse), daughters' psychiatric visits, and sons' use of tranquillizers. Same-sex siblings and grandparents provide important protective support.

JEL Classification: I12, I29, J13.

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Can the traumatization of parents affect their children's outcomes? This question has been the subject of extensive debate among researchers. Evidence suggests that such traumatization can cause parenting limitations that can disrupt a young child's development (van Ee, Kleber and Jongmans, 2016). Moreover, psychopathology in parents has consistently been associated with the risk of their children developing psychiatric disorders (Manning and Gregoire, 2006), and children's mental health is an important factor in their educational and labor market outcomes (Currie, 2009; Currie and Stabile, 2006; Lundborg, Nilsson and Rooth, 2014). While researchers can easily compute the magnitude of correlations between parental and child health, identifying the causal impact of parental health—and particularly that of parental mental health problems—on child outcomes is more challenging.

One area in which such causality can be studied, given suitable data, is the military deployment of parents to conflict zones. Since the 1955-1975 Vietnam War, researchers have recognized that children of deployed soldiers face an increased risk of developing behavioral problems (White et al., 2011). Since early 1990s, millions of soldiers, many of them parents, have been deployed on international missions to conflict zones worldwide. These soldiers, who often have traumatic experiences, face an increased risk of developing mental disorders (Cesur, Sabia and Tekin, 2013). Parental deployment might affect children not only while the parent is absent but also several years later, due to the dynamics of family relationships and parental mental health (Lester and Flake, 2013). While many studies have documented associations between parental deployment and children's mental health, none have identified the causal effect on children's outcomes of parental exposure to combat during deployment.

The literature on the impact of deployment on families has focused mainly on soldiers' subsequent health and earnings, with much less known about the impact on children's outcomes and the broader family's well-being. Additionally, little is known about the influence of parental deployment *per se* or parental combat exposure during deployment on the outcomes of children and families.[1]

Our study investigates the effects of fathers' combat exposure on family outcomes by linking military communications detailing the father's combat exposure in Afghanistan and Iraq with family register data. Our study is the first to establish the causal impact of an individual father's (third-party-reported) combat exposure on family outcomes in general and child outcomes in particular—measured by household composition, family mental health, and children's test scores. We combine classified mission reports detailing individual soldier combat exposure with administrative data on family members for scores in national end-of-compulsory-schooling exams, the use of mental health services, psychiatric diagnoses, purchase of prescription psychotropics and opioids,

[1] See e.g., Goodman and Isen (2020) for the effect of the Vietnam draft lottery on the next generation's labor market outcomes.

and suicide attempts.

Danish data is especially informative because soldiers and civilians have common universal healthcare coverage. All citizens have free access to a general practitioner, who acts as a gatekeeper for free access to specialists, hospitals, and heavily subsidized prescription drugs. Soldiers and their families are treated in the same hospitals as civilians and have access to the same general practitioners and specialists. Universal access removes economic barriers to healthcare and, combined with comprehensive registration, allows us to follow our population of interest. Danish soldiers experienced significant combat exposure; indeed, Denmark was the NATO country with the highest number of casualties per capita in the International Security Assistance Force in Afghanistan (Jakobsen and Ringsmose, 2015). [2]

To credibly estimate the causal effect of a father's exposure to combat on family outcomes, we use the distinctive features of combat during the Iraq and Afghanistan missions. Both missions are part of the Global War on Terrorism and characterized as diffuse wars because they involved asymmetric warfare in which the enemy was of inferior strength and employed tactics such as using remotely detonated improvised explosive devices (IEDs) (Buffaloe, 2006; Wallace, 2009). In such combat situations, predicting whether a soldier will be involved in an ambush or exchange of fire is extremely difficult. These factors make the individual risk of exposure to combat (conditional on mission and rank) as good as randomly distributed—as our results confirm. Thus, we can identify the causal effect of a father's combat exposure on family outcomes by comparing those who were exposed to combat with deployed fathers who were not similarly exposed.

We find that the teenage children of fathers who have been deployed and exposed to combat have lower test scores than the children of deployed fathers not exposed to combat (an effect size of 0.13 standard deviations). These results are robust to several falsification tests, which consider fathers' combat exposure after children's tests are taken, and events unrelated to combat, but mentioned in military communications.

To understand the channels through which combat exposure effects operate, we examine whether lower test scores coincide with mental health problems for the exposed father and his close family. We find that combat exposure affects the father's mental health in terms of increasing the likelihood of being diagnosed with substance abuse but not Post Traumatic Stress Disorder (PTSD). The effects spill over to daughters, who have more contact with psychiatrists, and sons, who purchase more tranquillizers. The effects on psychiatric diagnoses and hospitalization for mothers and children emerge several years after the father's exposure.

[2] In 2003-2012 Denmark deployed 9,000 soldiers (12,000 deployments) in 21 peace-enforcing missions in Afghanistan and Iraq with a casualty rate of 1.9 percent (Lyk-Jensen, 2022). These numbers compare to 1.9 million U.S. soldiers deployed (Bilmes, 2021) and a casualty rate of 2.1 percent (Sabia and Skimmyhorn, 2023). Fifty-seven percent of Danish men deployed to Afghanistan and Iraq were fathers, compared with 49 percent of U.S. soldiers (U.S. Institute of Medicine, 2013).

When examining the impact of family composition, we find that while combat exposure does not affect fertility, it increases divorce when the child is in the early teens. Having parents who are married or living together serves as an effective mediating factor, protecting children from the significantly negative impact of their father's combat exposure on test scores. A final striking finding is the importance of siblings and relatives living outside the household in either moderating or accentuating the effects of combat exposure on test scores. For example, grandparents protect against the effects of combat exposure for their first-born grandchildren, and grandfathers protect against the effects of combat exposure for all but their youngest grandchildren.

Our study adds to the small literature that exploits natural experiments to estimate the impact of deployment. While most of these studies focus on the deployment effect on soldiers' mental health (e.g., Cesur, Sabia and Tekin, 2013; Lyk-Jensen, Weatherall and Jepsen, 2016) or labor market outcomes (e.g., Sabia and Skimmyhorn, 2023; Bruhn et al., 2024), few investigate the impact on their partners (Cesur and Sabia, 2016) or children. Angrist and Johnson IV (2000) find that parental absences due to Gulf War deployments had an impact on marital dissolution and spousal labor supply but no effect on child disability rate. Richardson et al. (2011) show slightly lower achievement scores for children whose parents deployed to Afghanistan or Iraq for more than 19 months than for those whose parents were deployed less or not at all. Mansfield et al. (2011) find a dose-response pattern between parental deployment and increased mental health diagnoses for children of all ages.

Engel, Gallagher and Lyle (2010) and Lyle (2006) exploit the exogeneity of parental deployment on the child's academic achievement, and find adverse effects of deployment on test scores. Forrest, Edwards and Daraganova (2018), in a study of the intergenerational consequences of war among the children of Australian Vietnam war veterans, use a retrospective survey to compare children of veterans with children of non-veterans. They find significant enduring adverse effects of parental deployment on the mental health of children in military families. Thus, while most studies investigating the impact of deployment on children show associations between parental deployment and child mental health, our study is the first to identify the causal effect of exposure to combat during deployment and its consequences for children's outcomes. Moreover, the previous studies were conducted with relatively small samples—with many relying solely on surveys of parents or using research designs that could not demonstrate causality.

Our study relates to the broader literature on the secondary victims of trauma (Velasco et al., 2023). Family members of first responders, police officers, and healthcare providers are at risk for secondary traumatic stress (Hensel et al., 2015; Baum, Rahav and Sharon, 2014), especially novice professionals, e.g., in criminal justice (De La Rue, Ortega and Rodriguez, 2024). Family members of crime victims have been shown to suffer spillover effects (McCann and Pearlman, 1990), as have the relatives of accident victims (Allenou et al., 2010). In communities affected by violence, poverty, or disasters, indirect exposure to trauma can have widespread effects, especially for helping professions, e.g., social workers, humanitarian workers, and faith leaders (Williamson et al., 2015). All of the studies focussing on other types of secondary victims are associational.

Building on the literature relating deployment to combat zones and child outcomes, we use a natural experiment that as good as randomly assigns fathers to potentially traumatizing events likely to affect their mental health and that of their close family members. In so doing, we make three contributions to this literature. First, we use individual records of combat exposure that are third-party reported and thus do not suffer from recall bias. Second, because of the diffuse nature of combat, we have exogenous variation in exposure to potentially traumatizing events. Third, in contrast to many other settings, we can identify indirect or spillover effects of fathers' trauma on the family, because only the deployed father is potentially directly exposed to combat. Taken together, our results have important implications not only for military families but also, most importantly, for understanding the channels affecting children's mental health in general, and the relationship between a traumatized parent and his or her children who are not directly exposed to the trauma.

The paper proceeds as follows. Section I explains the institutional setting and access to health care in Denmark. Section II describes our data, and Section III presents our empirical approach. Section IV presents our results, and Section V concludes.

I. Institutional Setting

Two factors characterize the Danish military system in the current study: limited conscription and deployable professionals (Heurlin, 2006). The deployed soldiers come either from the Army Reaction Forces Training (Hærens Reaktionsstyrke Uddannelse, HRU) or from the Army Standing Reaction Force (Haerens Staaende Reaktions Styrke, SRS). HRU soldiers usually volunteer for deployment after conscription (basic training) and have short-term contracts. In contrast, SRS soldiers are professionals with long-term contracts covering a full career (see Lyk-Jensen and Pedersen, 2019 for further details). Unlike soldiers in many other NATO countries, many Danish soldiers—especially HRU soldiers—leave the military after one or two deployments. Typically, Danish soldiers are deployed for six-month tours of duty.

Although the Danish military has its own medical system, the "Military Health System" (MHS), it is not an alternative to the civilian National Health Service (NHS). While the MHS mainly ensures that soldiers are fit for deployment and provides within-deployment medical support, only the NHS provides access to hospital treatment. Soldiers and their family members are treated in the same hospitals as civilians and have access to the same GPs and specialists.[3] Registration

[3]The MHS also offers free psychological help from military or private psychologists, even after the soldier has left the military. However, military psychologists cannot prescribe medicine or refer soldiers to psychiatric hospitals.

of psychiatric diagnosis occurs either as acute emergency cases or through hospital contacts via referrals from civilian or military GPs or specialists.

II. Empirical Approach

We exploit a natural experiment in which fathers who have been deployed soldiers are as good as randomly assigned to potentially traumatizing events that are likely to affect their own mental health and possibly that of close family members. As Iraq and Afghanistan missions are characterized as both diffuse wars (with the enemy often hidden among civilians and the threats diffuse) and asymmetric wars (with enemies of inferior strength using roadside bombs and mines) (Buffaloe, 2006; Wallace, 2009), predicting the probability of the soldiers being involved in an exchange of fire or a rocket attack is extremely difficult. These factors make the risk of exposure to such a combat event as good as being randomly distributed within and between military units, allowing us to credibly estimate the causal effect of having a father exposed to combat on his children's test scores and mental health outcomes.

To ensure that combat exposure among the deployed soldiers is as good as random, we conduct a balancing test that explains combat exposure (1/0) by soldiers' pre-deployment characteristics such as year of birth, family background (e.g., parental education, and household income), conditional on their military characteristics (rank at first mission, the specific mission, and the type of unit).

We start by investigating the effect of the fathers' combat exposure on their children's test scores for 9th grade (age 14-16). To measure this effect, we estimate the following equation:

$$S_{cf} = \pi_0 + \pi_1 C_f + \pi_2 X_{cf} + \upsilon_{cf}, \qquad (1)$$

where S_{cf} is the test score of the child c of father f, C is a dummy indicating whether the father of child c is exposed to combat, and X is a set of control variables for the child's family background. If combat exposure is as good as random, we can directly estimate this equation using ordinary least squares (OLS) to identify π_1 as the effect of combat exposure on test scores. However, it may be that fathers exposed to combat are different in unobserved ways from non-exposed fathers. To control for these unobserved differences, we can compare the effect of the father's combat exposure occurring before and after the child's test:

$$S_{cft} = \beta_0 + \beta_1 C_{ftj} + \beta_2 C_{ftk} + \beta_3 C'_{ftk} + \beta_4 X_{cf} + \eta_{cft}, \qquad j < t \leq k \qquad (2)$$

where t is the timing of the test relative to combat exposure before C_{ftj} or after C_{ftk} the test is taken. In equation 1, the reference category was deployed fathers never exposed to combat. In equation 2 we classify fathers never exposed to combat C'_{ftk}, where k refers to their first deployment among our missions being *after* the test is taken. Hence, the control group becomes never exposed fathers first deployed before the test is taken. The coefficient of interest β_2 identifies the effect of combat exposure controlling for unobserved heterogeneity between those exposed and not exposed to combat.

We explore potential mechanisms for test score effects by considering mental health outcomes:

$$M_{cf} = \gamma_0 + \gamma_1 C_f + \gamma_2 X_{cf} + \zeta_{cf}, \tag{3}$$

where M_{cf} is a binary indicator taking the value one if a mental health outcome is observed for child c of father f, and taking the value zero otherwise. Analogously to equation 1, if combat exposure is as good as random, we can directly estimate this equation using OLS to identify γ_1 as the effect of combat exposure on mental health.

In contrast to test scores, mental health can be observed at any age. Hence, we can extend the specification to account for dynamic difference-in-differences:

$$M_{cft} = \delta_0 + \sum_{t=-3}^{5} \left(\delta_{1t}\,\text{Year}_t \cdot \text{C}_f + \delta_{2t}\,\text{Year}_t\right) + \delta_3 X_{cf} + \varepsilon_{cft}, \tag{4}$$

where M_{cft} is a binary indicator taking the value one if a mental health outcome is observed up to and including time t for child c of father f, and taking the value zero otherwise. Year_t represents the years we observe before and after the deployment or exposure. In this specification, δ_{1t} identifies the effect of combat exposure on mental health up until period t.

III. Data

We have access to administrative records from the Danish Ministry of Defense for soldiers deployed on all 21 peace-enforcing missions in Afghanistan and Iraq during 2003-2012—about 12,000 deployments and 9,000 soldiers. Our military register dataset contains individual information on soldiers' rank (private, sergeant, officer), type of unit (combat, support, staff), mission location, and dates. We also have access to military communications about individual combat exposure for these 21 missions in Afghanistan and Iraq during the same period.

The unique civil registration number assigned to each individual in Denmark allows us to link military records to other Statistics Denmark administrative registers containing information on family relationships, demographic characteristics (including education outcomes), and mental health outcomes.

A. Test Scores and Mental Health Measures

We have access to nationwide Danish language and math test scores from the spring of the final year of lower secondary school (9th grade, typically age 15). The test in Danish language skills consists of oral and written tests; the one for math, a written test and a possible oral test (determined by lottery). We standardize the test scores for children born 1986-2004 by year and subject (mean equal to zero and standard deviation equal to one).

As in Lyk-Jensen and Pedersen (2019) and Lyk-Jensen, Weatherall and Jepsen (2016), we use objective measures for mental health. To measure the use of mental health services among soldiers and their family members, we use the Psychiatric Central Case Register (Munk-Jørgensen and Mortensen, 1997; Mors, Perto and Mortensen, 2011), which also contains information about types of diagnosis. We also use the National Health Service Register (Schmidt et al., 2015), for information on health insurance-subsidized treatment from psychiatrists and psychologists (Olivarius et al., 1997; Andersen, Olivarius and Krasnik, 2011).

To examine the individual's purchase of mental health medication (MHM), which we use as another indicator of psychological problems, we use data from the National Prescription Registry, which classifies prescription medicine according to the Anatomical Therapeutic Chemical (ATC) Classification system. It contains data on prescribed drugs purchased from 1995 (Kildemoes, Sørensen and Hallas, 2011).[4] We identified purchased prescriptions for the following ATC-coded drug classes: antipsychotics (N05A), anxiolytics (N05B), hypnotics and sedatives (N05C), antidepressants (N06A), and psychostimulants (N06B). We both analyze these six drug classes together (MHM) and separately investigate their purchase and the purchase of opioids (N02A). We also examine suicide attempts, which in Denmark, are identifiable from the National Patient Register and Psychiatric Central Case Register.[5]

B. Combat Exposure Data

To characterize the fathers' combat exposure, we use special events from the military communication archives. We have about 1,500 events (combat and non-combat), distributed among the 21 missions and 9,000 deployed personnel.[6] Combat events include ambush, direct and indirect fire, IEDs, combat and collateral damage, and combat support. Non-combat events include non-combat injury or accident (non-battle related).

We focus on how combat and non-combat events may affect the father directly and close family members (i.e., children and co-parents) indirectly. Figure 1 shows the distribution of combat

[4] From 1997, the Danish National Prescription Registry includes the use of medicines in hospitals.

[5] We find suicide attempts in the registers by either using the International Classification for Diseases (ICD)-10 codes X60-X84 or using the reason for contact to hospital (e.g., suicide attempt or self-harm).

[6] See Appendix B for more details of combat exposure data collection and construction.

exposure among the 1,401 fathers with children born 1986-2004 for the 21 missions (9 missions in Iraq and 12 missions in Afghanistan). Figure 2 shows the child's age at father's first exposure or mission.

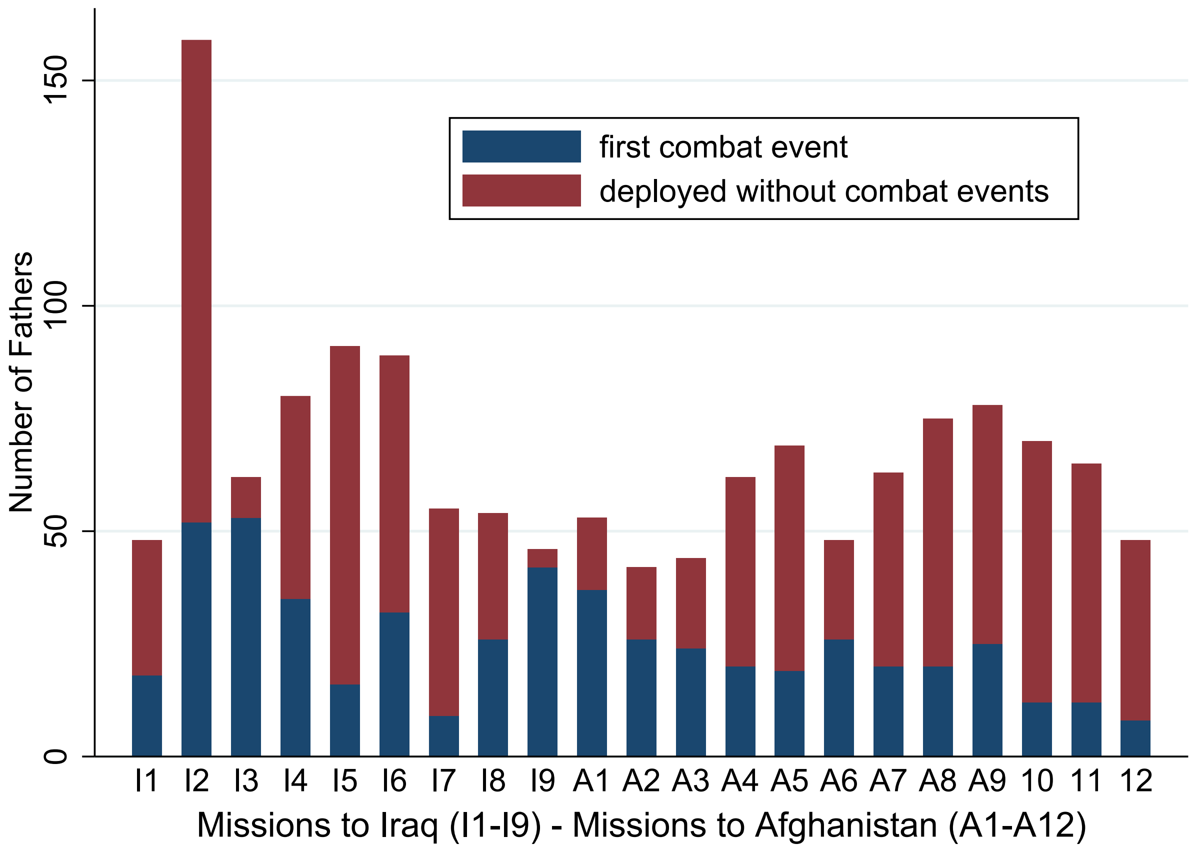

FIGURE 1. Father's First Combat Exposure by Mission.

Notes: The sample includes fathers deployed to Afghanistan or Iraq during 2003-2012. These fathers and a co-parent are born 1955-1985, with a child born 1986-2004. The child is resident in Denmark on January 1 of each year through age 16. Blue bars represent the number of fathers experiencing a first combat event in one of the 21 missions. Red bars represent the number of fathers on their first deployment in a given mission, conditional on their not experiencing a combat event during the 21 missions. Each mission lasts six months, usually with a two-week overlap between deployment and replacement. The last three missions to Iraq (I7-I9) coincided with the first three missions to Afghanistan (A1-A3) during 2006-2007.

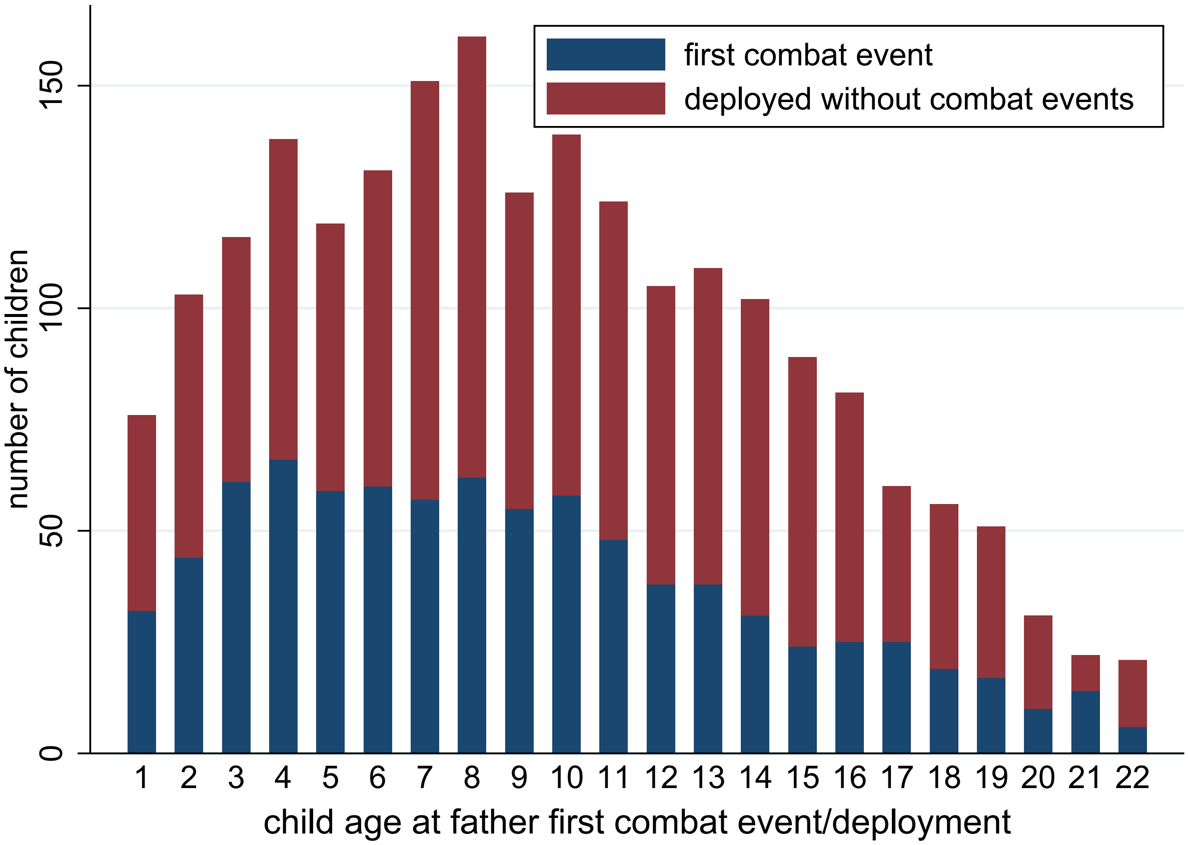

FIGURE 2. Child's Age at Father First Combat Exposure

Notes: The sample includes children born 1986-2004 and resident in Denmark every 1 January until turning 16, with both parents born 1955-1985 and fathers deployed to Afghanistan or Iraq during 2003-2012. Blue bars represent the number of children of a given age with a father experiencing a first combat event among these missions. Red bars represent the number of children of a given age with a father on his first deployment in a given mission, conditional on his not experiencing a combat event during the 21 missions.

C. Sample and Descriptives

We focus on soldiers deployed to Iraq in 2003-2009 and to Afghanistan in 2006-2012. For our estimation sample, we select deployed fathers whose children are in cohorts where test scores are available, i.e., children born 1986-2004.[7]

[7]Given that we observe 436 female soldiers from these missions, only 11 of whom had children born 1986-2004, we study only fathers' combat exposure.

TABLE 1—Background Characteristics of Deployed Men in the Year Prior to First Deployment

	(1) All Men Deployed	(2) Men Born 1955-1985	(3) Fathers Born 1955-1985	(4) With a Child Born 1986-2004
Age	28.117	27.920	29.701	38.411
	(7.783)	(7.479)	(7.909)	(6.734)
HH disposable income	40.086	40.069	39.207	37.757
	(23.251)	(23.277)	(21.564)	(17.279)
High school	0.519	0.519	0.511	0.421
College	0.149	0.146	0.195	0.331
Brothers		0.759	0.768	0.794
		(0.810)	(0.807)	(0.830)
Sisters		0.736	0.739	0.737
		(0.770)	(0.776)	(0.779)
Half-siblings		0.627	0.616	0.488
		(1.202)	(1.208)	(1.113)
Mother high school		0.400	0.393	0.330
Mother college		0.254	0.225	0.161
Father high school		0.473	0.468	0.433
Father college		0.220	0.211	0.169
Individuals	8,923	8,706	4,938	1,401

Notes: Descriptive statistics for the year before first deployment to Afghanistan or Iraq. The sample for column 1 includes all men deployed to Afghanistan or Iraq in 2003-2012. Column 2 restricts this sample to those born 1955-1985. Column 3 further restricts this sample to deployed fathers with a co-parent also born 1955-1985. Column 4 further restricts this sample to having children born 1986-2004, with the child resident in Denmark on January 1 of each year through age 16. Household (HH) disposable income is reflated to 2020 and converted to thousands of USD. Income is equivalized by the formula 1*first_adult+0.7*second_adult+0.5*number of children where adults are age 14+. The reference category for schooling is less than high school. Siblings and half-siblings are counted. Means and standard deviations in parentheses.

Table 1 shows that the deployed soldiers with children born in 1986-2004 are older and have six percent lower equivalized household incomes than all the deployed soldiers. Moreover, 33 percent of these deployed soldiers have a college education, compared with 15 percent of all the deployed soldiers.

TABLE 2—Military Records for Deployed Men

	(1) All Men Deployed	(2) Men Born 1955-1985	(3) Fathers Born 1955-1985	(4) With a Child Born 1986-2004
Private	0.625	0.637	0.548	0.374
Sergeant	0.201	0.200	0.247	0.288
Officer	0.132	0.129	0.172	0.266
Combat unit	0.350	0.359	0.322	0.134
Support unit	0.530	0.529	0.540	0.600
Staff unit	0.109	0.102	0.126	0.243
Combat event	0.574	0.581	0.541	0.380
Under Attack	0.124	0.125	0.118	0.109
Troops in contact	0.378	0.385	0.333	0.194
Improvised explosive device	0.331	0.338	0.294	0.150
Non-combat event	0.080	0.080	0.080	0.092
Taking prisoners	0.013	0.013	0.015	0.016
Non-combat injury	0.049	0.050	0.048	0.059
Accident	0.021	0.021	0.021	0.019
Deployed 1991-1996	0.112	0.107	0.144	0.345
Deployed 1997-2002	0.176	0.174	0.218	0.295
Deployed Balkans	0.399	0.393	0.466	0.664
Individuals	8,923	8,706	4,938	1,401

Notes: Means of binary indicator variables for the first deployment to Afghanistan or Iraq. The sample for column 1 is all men deployed to Afghanistan or Iraq in 2003-2012. Column 2 restricts this sample to deployed men born 1955-1985. Column 3 further restricts this sample to deployed fathers with a co-parent also born 1955-1985. Column 4 further restricts this sample to having children born 1986-2004, with the child resident in Denmark on January 1 of each year through age 16. For rank and unit type, we do not show the residual category. Combat event is an indicator variable taking the value one for a soldier experiencing a special event with the primary classifications. Non-combat events are special events with the primary classifications. Non-combat events are overwritten with zero if the soldier is ever exposed to a combat event. We know whether these men were deployed before 2003 or deployed elsewhere. However, we do not observe combat exposure for those deployments. We split the observation window for previous deployments in half and distinguished The Balkans as the most common deployment elsewhere.

Table 2 shows the military characteristics of the fathers compared to all men deployed to Iraq and Afghanistan in 2003-2012. Deployed fathers with children born 1986-2004 are twice as likely to be officers, more often serve in staff units, and are more likely to have been deployed previously or elsewhere. These fathers are less likely than deployed men in general to experience a combat event and more likely to experience a non-combat event.

Table 3 compares children with deployed fathers and all children born 1986-2004. Given that many officers belong to staff units, this category has higher family income. The size of a "deployed family" is slightly smaller than that of the general population, as shown by the child's number of siblings, although deployed fathers are more likely to come from larger families and generally have lower education than the general population. Soldiers deployed by the U.S. and Denmark are remarkably similar in many respects. For the U.S. (Denmark, our sample), 49 (56) percent had dependent children, soldiers were deployed to an average of 1.7 (1.7) missions, and of those deployed, 57 (59) percent were deployed only once. The average length of deployments was 7.7 (6.0) months (Institute of Medicine, 2013).

TABLE 3—Child Characteristics by Father Deployment Status

	All (1)	Deployed (2)	Iraq (3)	Afghanistan (4)	Combat (5)	Support (6)	Staff (7)
Child male	0.513	0.495	0.514	0.477	0.505	0.487	0.507
Child's brothers	0.396	0.350	0.328	0.371	0.333	0.353	0.352
	(0.633)	(0.612)	(0.559)	(0.655)	(0.603)	(0.598)	(0.643)
Child's sisters	0.373	0.308	0.284	0.329	0.211	0.317	0.328
	(0.618)	(0.569)	(0.521)	(0.608)	(0.442)	(0.591)	(0.564)
Child's half-siblings	0.215	0.216	0.206	0.225	0.112	0.247	0.193
	(0.643)	(0.601)	(0.596)	(0.606)	(0.377)	(0.643)	(0.579)
Father high school	0.513	0.443	0.407	0.476	0.442	0.511	0.298
Father college	0.216	0.253	0.273	0.234	0.084	0.139	0.565
Father's household disposable income	27.625	27.634	27.939	27.356	27.195	27.197	28.752
	(12.421)	(6.446)	(6.638)	(6.256)	(5.710)	(6.086)	(7.303)
Mother high school	0.461	0.521	0.509	0.533	0.544	0.524	0.505
Mother college	0.251	0.248	0.251	0.246	0.183	0.210	0.358
Individuals	1,005,425	2,419	1,152	1,267	285	1,453	681

Notes: Descriptive statistics for children born 1986-2004 who are resident in Denmark on January 1 of each year through age 16, and have parents born 1955-1985. Column 1 includes all these children; column 2 restricts children to those with a father deployed to Afghanistan or Iraq in the period 2003-2012. Columns 3 and 4 split these children of the deployed by country of first deployment during the period. Columns 5-7 split these children by father's unit type at first deployment during the period. Household disposable income is measured when the father was 15 or 25 years depending on his year of birth, reflated to 2020, converted to thousand USD, and equivalized by the formula 1*first_adult+0.7*second_adult+0.5*number of children where adults are age 14+. The reference category for schooling is less than high school. The child's siblings and half-siblings are counted. Means and standard deviations in parentheses.

Table 4, Column (1), shows descriptive statistics for the children of soldiers: 93 percent took the 9th grade tests in Danish and math (similar to the percentage in the full population see Table 6)—and that, on average, 38 percent had a father exposed to combat, while nine percent had a father exclusively exposed to non-combat events. As fathers can be deployed more than once, we use the first mission of exposure. Given that most Iraq missions precede those in Afghanistan, the fathers deployed to Iraq appear more exposed than those deployed to Afghanistan (41 percent vs. 35 percent). Not surprisingly, fathers from combat units were more exposed to combat events.

TABLE 4—Descriptive Statistics for Fathers' Combat Exposure and Children's Test Scores

	Deployed (1)	Iraq (2)	Afghanistan (3)	Combat (4)	Support (5)	Staff (6)	Exposure (7)	None (8)
Combat event	0.380	0.414	0.347	0.775	0.378	0.185	1.000	0.000
Non-combat event	0.092	0.053	0.130	0.070	0.114	0.054	0.000	0.148
Test taken	0.929	0.930	0.928	0.902	0.930	0.937	0.929	0.928
Test score	0.032	-0.002	0.062	-0.121	-0.053	0.271	-0.064	0.085
	(0.967)	(0.969)	(0.965)	(0.988)	(0.968)	(0.915)	(0.975)	(0.959)
Fathers	1,401	684	717	187	841	373	532	869
Children	2,419	1,152	1,267	285	1,453	681	877	1,542
Scores	30,474	14,428	16,046	3,455	18,330	8,689	10,900	19,574

Notes: The sample contains children born 1986-2004 and resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Iraq or Afghanistan 2003-2012. "Combat" event is an indicator variable taking the value 1 for the father's first combat exposure. Similarly, "non-combat" event takes the value 1 for the father's first exposure to a non-combat event, conditional on his never being exposed to a combat event. Both rows show means by father and standard deviations in parentheses. Test taken is an indicator taking the value 1 if the child has at least one test score in 9th grade and 0 otherwise. The row shows means by child and standard deviations in parentheses. Test scores include all 9th grade Danish and math test scores. We standardize test scores by subject and year for all children with parents in these cohorts. The row shows means weighted by child, with standard deviations in parentheses. Columns 2-3 split the sample by country of fathers' first event exposure or deployment; columns 4-6 split the sample by unit type for the fathers' first event exposure or deployment. Columns 7-8 split the sample by exposure to combat events.

Table 4 also shows simple statistics for the children's test scores. We pool all 30,460 tests (Danish and math) taken by children of soldiers. All scores are standardized by subject and year. The figures show that children with fathers from staff units have higher scores than those with fathers from combat units. Children of exposed fathers have lower test scores than those of non-exposed fathers.

D. Combat Exposure Balancing Test

In Table 5 after controlling for dummies for year of birth, mission, type of unit, and rank, we test the balancing of combat exposure on the background characteristics of deployed fathers and their families. Using an extensive set of predetermined variables, we show that none of them can predict the occurrence of combat or non-combat events, according to F-statistics of joint significance of covariates (p-values > 0.37). Table 5 shows that combat or non-combat event exposure is largely independent of the soldier's family characteristics as measured in the year before childbirth. Columns 1 and 4 cover the father's characteristics; columns 2 and 5 also control for mother's characteristics; and columns 3 and 6 control for children's and other family characteristics.[8] We find insignificant F-statistics across all specifications for both exposures. Conditional on the specific mission, rank, unit type, and birth year, we find that combat exposure and non-combat event exposure are as good as randomly distributed among deployed fathers.

[8]Appendix Table A.1 presents coefficients on other family covariates.

TABLE 5—Balancing Tests for Exposure to Combat and Non-Combat Events

	Combat			Non-combat		
	(1)	(2)	(3)	(4)	(5)	(6)
Father high school	-0.0268	-0.0260	-0.0276	0.0138	0.0133	0.0133
	(0.0279)	(0.0281)	(0.0281)	(0.0169)	(0.0170)	(0.0171)
Father college	-0.0818*	-0.0741	-0.0747	0.0149	0.0151	0.0149
	(0.0472)	(0.0476)	(0.0476)	(0.0286)	(0.0289)	(0.0289)
Father's mother HS	0.0224	0.0217	0.0233	0.00640	0.00499	0.00446
	(0.0271)	(0.0272)	(0.0272)	(0.0164)	(0.0165)	(0.0165)
Father's mother col.	0.00655	0.00201	0.00319	-0.0132	-0.0118	-0.0123
	(0.0367)	(0.0369)	(0.0369)	(0.0222)	(0.0224)	(0.0224)
Father's father HS	0.000404	-0.000708	-0.000588	-0.0133	-0.0108	-0.0109
	(0.0262)	(0.0262)	(0.0262)	(0.0159)	(0.0159)	(0.0159)
Father's father col.	-0.00845	-0.0144	-0.0157	-0.00599	-0.00488	-0.00473
	(0.0366)	(0.0368)	(0.0367)	(0.0222)	(0.0223)	(0.0223)
Father's brothers	0.0203	0.0167	0.0184	-0.00273	-0.00281	-0.00280
	(0.0141)	(0.0142)	(0.0142)	(0.00857)	(0.00862)	(0.00864)
Father's sisters	-0.00831	-0.00750	-0.00619	-0.00718	-0.00748	-0.00756
	(0.0151)	(0.0151)	(0.0151)	(0.00914)	(0.00917)	(0.00918)
Log Disp. Income	0.0160	0.0149	0.00824	0.00248	0.00180	0.00351
	(0.0359)	(0.0362)	(0.0364)	(0.0217)	(0.0219)	(0.0221)
Deployed 1991-1996	0.0777	0.0738	0.0611	-0.0308	-0.0313	-0.0295
	(0.0479)	(0.0480)	(0.0486)	(0.0290)	(0.0291)	(0.0295)
Deployed 1997-2002	-0.0249	-0.0305	-0.0375	0.00621	0.00728	0.00797
	(0.0454)	(0.0454)	(0.0457)	(0.0275)	(0.0276)	(0.0278)
Deployed Balkans	0.0192	0.0241	0.0219	0.0156	0.0155	0.0171
	(0.0439)	(0.0440)	(0.0440)	(0.0266)	(0.0267)	(0.0268)
Mother controls	No	Yes	Yes	No	Yes	Yes
Child controls	No	No	Yes	No	No	Yes
F-Statistic	0.748	0.886	1.090	0.290	0.525	0.485
F-Stat p-value	0.665	0.591	0.352	0.978	0.942	0.976
Partial-R^2	0.00522	0.0117	0.0177	0.00203	0.00695	0.00794
Observations	1,401	1,401	1,401	1,401	1,401	1,401

Notes: The sample contains men born 1955-1985, and deployed to Iraq or Afghanistan in 2003-2012. These men are fathers of children born 1986-2004. These children are resident in Denmark on January 1 of each year until age 16. Columns present coefficients from different OLS regressions. The dependent variable for columns 1-3 is an indicator taking the value 1 if the father was exposed to a combat event while deployed, and 0 otherwise. The dependent variable for columns 4-6 is an indicator taking the value 1 if the father was exposed to a non-combat event, conditional on his never being exposed to a combat event, and 0 otherwise. Additional controls included but not shown are dummies for mission, rank (private, sergeant, officer, other), unit type (combat, support, staff, other), year of birth of father and mother (columns 2, 3, 5 and 6), and year of birth of child (in columns 3 and 6). For these regressions, each father has one observation; we choose the first child born in the cohort range with the mother of this child. Standard errors in parentheses. Coefficients for additional covariates included in the regressions are presented in Appendix Table A.1

IV. Results

This section presents the association between fathers' deployment and children's test scores and the causal effect of fathers' combat exposure on their children's test scores, conditional on deployment. We explore heterogeneous responses by child age of exposure. As children are about the same age at end-of-compulsory school test taking, we can identify a potentially "immune group" who are tested before fathers' combat exposure and for whom we expect test scores to be unrelated to exposure.

To check the robustness of our estimates, we perform three sensitivity analyses. First, we exclude different types of events from our combat exposure measure. Second, we conduct a placebo analysis of the effects of non-combat events recorded in military communications. Third, we compare the effect of single versus multiple combat events on test scores. In addition, to explore potential mechanisms for the combat exposure effects on test scores, we examine mental health outcomes for the family, effects on fertility and divorce, and the protective role of relatives.

A. Deployment, Combat Exposure, and Test Scores

Table 3 shows that deployed fathers are similar to all Danish fathers in terms of socioeconomic status, with similar household income, whereas the size of the "deployed family" is smaller (fewer child siblings). Table 6 shows that after we control for an extensive set of observed characteristics, fathers' deployment is not associated with children's test scores. This finding contrasts with the negative child test score associations with parental deployment found for the U.S. (Engel, Gallagher and Lyle, 2010; Richardson et al., 2011). Denmark's welfare system and supportive family policies ease stress during a father's deployment, helping children maintain routines and academic performance. This context—along with the fact that deployed Danish fathers appear to share socioeconomic similarities with other Danish fathers—means that potential negative impacts on children's learning are diminished or offset in ways not observed in U.S. samples.

TABLE 6—Deployment and Children's Test Scores

			Sex		Assessment		Subject	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tested	All Tests	Female	Male	Teacher	Exam	Danish	Math
Deployed	-0.002	0.005	0.004	0.006	0.001	0.009	0.026	-0.030
	(0.006)	(0.016)	(0.020)	(0.022)	(0.017)	(0.017)	(0.017)	(0.018)
Child male	-0.033	-0.263			-0.278	-0.244	-0.421	0.004
	(0.001)	(0.001)			(0.002)	(0.001)	(0.001)	(0.002)
Exam		-0.021	-0.051	0.007			-0.015	-0.035
		(0.001)	(0.001)	(0.001)			(0.001)	(0.001)
Math		0.003	-0.175	0.179	0.037	0.027		
		(0.001)	(0.001)	(0.001)	(0.001)	(0.002)		
Mean dependent variable	0.927	-0.001	0.142	-0.142	0.022	-0.008	0.002	0.002
Mean deployed	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002
R^2	0.044	0.159	0.159	0.152	0.170	0.146	0.174	0.163
Fathers	548,756	525,928	350,284	352,658	523,598	522,844	525,042	524,262
Children	1,004,994	931,933	461,680	470,253	923,900	923,240	929,076	926,774
Observations	1,004,994	12,716,404	6,322,064	6,394,340	6,703,580	6,012,824	7,957,731	4,758,673

Notes: The sample contains children born 1986-2004 and residents in Denmark on January 1 of each year through age 16, with parents born 1955-1985. Columns 2-8 are restricted to children with a 9th grade test score in Danish or math. Columns 3-8 further split the test score sample according to the child's sex, assessment method, and test subject. Each column presents estimates from separate OLS regressions. In column 1 the dependent variable is an indicator taking the value 1 if a test score is observed for the child, and 0 otherwise. In columns 2-8, the dependent variable is the standardized test score. Deployed is an indicator variable taking the value 1 if the father was deployed in Afghanistan or Iraq in 2003-2012, and 0 otherwise. For column 1, other variables included in the regressions but not shown are the same as in column 3 of Table 5. Columns 2-8 also include dummies for test year. Observations are per child in column 1; test scores are weighted by child in columns 2-8. Standard errors clustered by father in parentheses.

Several studies have analyzed the relationship between the deployment of fathers and the outcomes of their children (White et al., 2011; De Pedro et al., 2011; Frederiksen et al., 2021).[9] Lyle (2006), who studies children of U.S. soldiers deployed during 1997-98 to peace-enforcing missions to the Balkans, show-of-force maneuvers in the Middle East, or humanitarian aid missions in developing countries, finds that parental absence due to deployment reduces test scores by ten percent of a standard deviation. Engel, Gallagher and Lyle (2010) focus on the children of U.S. soldiers deployed to peace-enforcing missions in Iraq and Afghanistan in 2002-05, finding that parental absence reduces math scores more than reading. Both studies sample children attending military schools (Department of Defense Education Activity Schools, Engel, Gallagher and Lyle, 2010) or schools on military installations (Lyle, 2006), and both use children of non-deployed personnel as the comparison group.

In contrast to these two studies, which use the exogenous variation in military deployment to study the impact of deployment as work-related parental absence on children's test scores, we focus on the effect of the father's combat exposure on their children's 9th-grade test scores. As both exposed and non-exposed fathers are deployed and therefore absent, we measure the additional

[9] In a cross-sectional study, Frederiksen et al. (2021) compare a sample of children of formerly deployed Danish fathers with a sample of control children from the Danish population. They show that, in general, the well-being (measured by responses to The Strengths and Difficulties Questionnaire) of the children of the deployed does not differ from that of the children of the control group.

effect of having a father exposed to combat on children's test scores compared to children having a deployed but non-exposed father. Our inference shows the effects of combat exposure conditional on deployment.

Given that combat exposure among the deployed is as good as random, we can now credibly estimate the effect of fathers' combat exposure on children's test scores. These estimates appear in Table 7. While about seven percent of children do not take a test at the end of 9th grade, column 1 shows no effect of combat exposure on children's probability of test taking. That combat exposure is not systematically related to observing a test score demonstrates that no effects on test scores are driven by selection into the test. Column 2 shows that combat exposure reduces test scores by 13 percent of a standard deviation—a magnitude of about half the test score difference by sex, as shown by the male coefficient. When we split the sample by sex, assessment method, and test subject in columns 3-8, the combat exposure effects are very similar.

TABLE 7—Effects of Fathers' Combat Exposure on Children's Test Scores.

			Sex		Assessment		Subject	
	(1) Tested	(2) All tests	(3) Female	(4) Male	(5) Teacher	(6) Exam	(7) Danish	(8) Math
Combat exposure	0.009	-0.125	-0.127	-0.117	-0.113	-0.109	-0.133	-0.112
	(0.014)	(0.037)	(0.050)	(0.053)	(0.039)	(0.038)	(0.039)	(0.044)
Male	-0.033	-0.268			-0.291	-0.240	-0.444	0.030
	(0.011)	(0.028)			(0.030)	(0.029)	(0.030)	(0.033)
Exam		-0.022	-0.059	0.014			-0.022	-0.033
		(0.009)	(0.012)	(0.014)			(0.011)	(0.012)
Math		-0.035	-0.193	0.134	0.007	0.023		
		(0.020)	(0.025)	(0.028)	(0.019)	(0.037)		
Mean of the dependent variable	0.928	0.022	0.155	-0.119	0.041	0.019	0.049	-0.015
Mean exposure	0.362	0.363	0.370	0.354	0.359	0.360	0.362	0.362
R^2	0.096	0.178	0.218	0.203	0.198	0.158	0.200	0.192
Fathers	1,401	1,346	902	848	1,335	1,337	1,343	1,337
Children	2,419	2,245	1,156	1,089	2,224	2,226	2,238	2,231
Observations	2,419	30,459	15,726	14,733	16,072	14,387	19,034	11,425

Notes: The sample contains children born 1986-2004 and resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Iraq or Afghanistan in 2003-2012. Columns 2-8 are restricted to children with a 9th grade test score in Danish or math. Columns 3-8 further split the test score sample according to the sex of the child, assessment method, and test subject. Each column shows estimates from separate OLS regressions. In column 1 the dependent variable is an indicator taking the value 1 if a test score is observed for the child, and 0 otherwise. In columns 2-8 the dependent variable is the standardized test score. Combat exposure is an indicator variable taking the value 1 if the father was exposed to a combat event, and 0 otherwise. For column 1, other variables included in the regressions but not shown are the same as in column 3 of Table 5; columns 2-8 also include dummies for the test year. Observations are per child in column 1, and test scores are weighted by child in columns 2-8. Standard errors clustered by father in parentheses.

B. Threats to Identification—Unobserved Heterogeneity

To check whether our findings are driven by unobserved heterogeneity (a threat to our identification strategy), we use differences in children's ages at the father's combat exposure to explore substantive differences in test score effects by age of exposure. While balancing tests add credibility to our quasi-randomization, we can only test for the significance of observed pre-determined characteristics in explaining combat exposure. However, combat exposure and test scores may be correlated with a third variable that we do not observe, a variable that may drive the results in Table 7. For example, if more risk-taking fathers are more likely to be exposed to combat, the risk-taking type itself may drive the observed relationship with test scores, not combat *per se*. Consequently, if the father's risk type is driving the association, then the children of such a father should display similar relationships between exposure and test scores, regardless of the timing of the test.

In this subsection, we explore this threat to identification in two ways. First, the tests are taken at around age 15, and the children in our sample are ages 1-22 when the father is first exposed to combat (see Figure 1); therefore, by examining the interaction of combat exposure with pre- and post-test indicators, we expect that only pre-test exposure will impact test scores. Second, because we observe a large proportion of siblings in our sample, we can study a subsample of children with fathers who were exposed to combat at some point. Within this more homogeneous sample, we can again examine the interaction of combat exposure with pre- and post-test indicators.

While Table 7 pooled all children of deployed fathers and used combat exposure regardless of its timing relative to the test, Panel A of Table 8 presents estimates interacting combat exposure with pre- and post-test indicators. As expected, the pre-test effects of combat exposure are significantly negative, whereas the post-test effects of combat exposure are statistically insignificant. However, the post-test exposure estimates are imprecise, making the difference between combat exposure pre- and post-test insignificant. This imprecision is likely due to a small sample size, with only a small percentage of the children tested before either the father's combat exposure or the first deployment if the father was never exposed.[10]

An alternative way of testing the robustness of our estimates to unobserved characteristics is to consider a more homogeneous sample of siblings—-who, by design, will have different ages at the time their father was exposed to combat. Panel B of Table 8 presents estimates for sibling pairs. Compared to the estimates in Panel A, which include singletons, the estimates for siblings in Panel B reveal larger negative effects of combat exposure before the test, and insignificant estimates of combat exposure after the test. The difference between combat exposure effects pre- and post-test are also insignificant for this sibling sample.

Columns 3 and 4 of Panel B split siblings according to whether they are of the same sex. Pre-test combat exposure causes 29 percent lower test scores for mixed-sex sibling pairs, in contrast to an insignificant effect for same-sex pairs, suggesting a protective effect of having a same-sex sibling. Panel C of Table 8 presents estimates for sibling pairs with exposed fathers. With this smaller sample, while the coefficients on pre-test combat exposure are less precise, they are statistically

[10] In a difference-in-differences specification, while controlling for father ever exposed, the coefficient on the interaction of exposure with the pre-test indicator is statistically insignificant (not shown).

significant and about twice as large as the estimates for all siblings as presented in Panel B.[11]

Table 8 shows no evidence supporting a "father's risk type" identification threat—an assumption that if the father type is driving the association, the relationships between father exposure and children's test scores should display a similar relationship regardless of test timing.

TABLE 8—Combat Exposure and with Pre- and Tost-Test Indicators

	(1) All tests	(2) Female	(3) Male	(4) Teacher	(5) Exam	(6) Danish	(7) Maths
Panel A: Interaction of tests with pre- and post-combat exposure (full sample)							
Test after combat	-0.138	-0.144	-0.141	-0.119	-0.122	-0.143	-0.112
	(0.0407)	(0.0542)	(0.0579)	(0.0427)	(0.0413)	(0.0430)	(0.0481)
Test before combat	-0.0641	-0.0635	-0.0161	-0.0530	-0.0336	-0.0608	-0.0763
	(0.0752)	(0.106)	(0.109)	(0.0803)	(0.0815)	(0.0883)	(0.0812)
Test after deploy.	0.0149	-0.0155	0.0637	0.00743	0.0344	0.0264	0.00708
	(0.0622)	(0.0849)	(0.0921)	(0.0664)	(0.0638)	(0.0665)	(0.0747)
P-value TAC-TBC	0.359	0.479	0.293	0.452	0.306	0.376	0.689
Mean dep. var.	0.0223	0.155	-0.119	0.0414	0.0192	0.0489	-0.0148
Mean exposure	0.301	0.307	0.295	0.299	0.299	0.301	0.301
R^2	0.178	0.216	0.203	0.177	0.145	0.154	0.193
Fathers	1,346	902	848	1,335	1,337	1,343	1,337
Children	2,245	2,245	2,245	2,245	2,245	2245	2245
Observations	30,459	15,726	14,733	16,072	14,387	19,034	11,425
Panel B: Interaction of tests with pre- and post-combat exposure (sibling pairs)							
	All tests	Same Sex	Dif. Sex	Teacher	Exam	Danish	Maths
Test after combat	-0.181	0.0392	-0.315	-0.141	-0.176	-0.182	-0.165
	(0.0577)	(0.0741)	(0.0800)	(0.0587)	(0.0603)	(0.0632)	(0.0669)
Test before combat	-0.0528	0.0965	-0.112	-0.00782	-0.0247	-0.0504	-0.0828
	(0.109)	(0.191)	(0.154)	(0.114)	(0.125)	(0.124)	(0.120)
Test after deploy.	-0.0392	-0.111	-0.0130	-0.0778	-0.00651	-0.0357	-0.0434
	(0.0897)	(0.135)	(0.109)	(0.0947)	(0.0941)	(0.0979)	(0.106)
P-value TAC-TBC	0.268	0.765	0.193	0.274	0.244	0.306	0.533
Mean dep. var.	0.0710	0.0850	0.0576	0.0981	0.0603	0.0966	0.0254
Mean exposure	0.288	0.315	0.261	0.285	0.285	0.288	0.286
R^2	0.197	0.245	0.320	0.229	0.181	0.193	0.248
Fathers	555	271	284	546	546	554	551
Children	2,245	2,245	2,245	2,245	2,245	2,245	2,245
Observations	15,116	7,368	7,748	7,908	7,084	9,453	5,636
Panel C: Interaction of tests with post-combat exposure (sibling pairs with exposed fathers)							
Test after combat	-0.359	-0.319	-0.0614	-0.413	-0.302	-0.216	-0.451
	(0.150)	(0.195)	(0.456)	(0.158)	(0.158)	(0.152)	(0.181)
Mean dep. var.	-0.0471	0.0528	-0.163	-0.0157	-0.0432	-0.0151	-0.0975
Mean exposure	0.824	0.822	0.827	0.829	0.829	0.829	0.822
R^2	0.322	0.422	0.508	0.382	0.310	0.351	0.433
Fathers	194	104	90	188	188	193	192
Children	387	208	179	375	375	385	383
Observations	5,187	2,819	2,368	2,696	2405	3,228	1,940

Notes: The sample contains children born 1986-2004 and resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Iraq or Afghanistan in 2003-2012. Children must have a 9th grade test score in Danish or math. Panel A presents estimates from interacting combat exposure with pre- and post-test indicators. Panel B presents estimates from the same specification as for Panel A but for a subsample of sibling pairs. Panel C presents estimates for a subsample of sibling pairs with exposed fathers.

[11] Because only 16 sibling pairs have different pre- and post-test exposure, we cannot consider sibling differences.

C. Heterogeneity by Children's Age at Fathers' First Combat Exposure

Apart from using the child's age at first exposure to explore robustness to unobserved heterogeneity, we also explore substantive differences in effects by age. Figure 3 shows estimates from sub-samples centred on different children's ages at the father's first combat exposure or first deployment if never exposed. The vertical lines in Figure represent the typical 9th grade testing ages of 14-16, with ages to the left indicating pre-test combat exposure for the given age; ages to the right, post-test exposure. Consistent with the differences in mean estimates in Table 8, the effects of first combat exposure after testing become insignificant. Exposure effects are relatively large pre-school, and then again from age 11, increasing in magnitude until age 13—one year before 9th grade tests are typically taken. The point estimate for combat exposure effect at age 13 is a drop of 20 percent of a test score standard deviation, allowing us to rule out effects with a drop smaller than 10 percent. While some attenuation in effects measured at the end of compulsory schooling may be expected for exposures in the early primary school years, that pre-school exposures at ages are still measurable is striking.

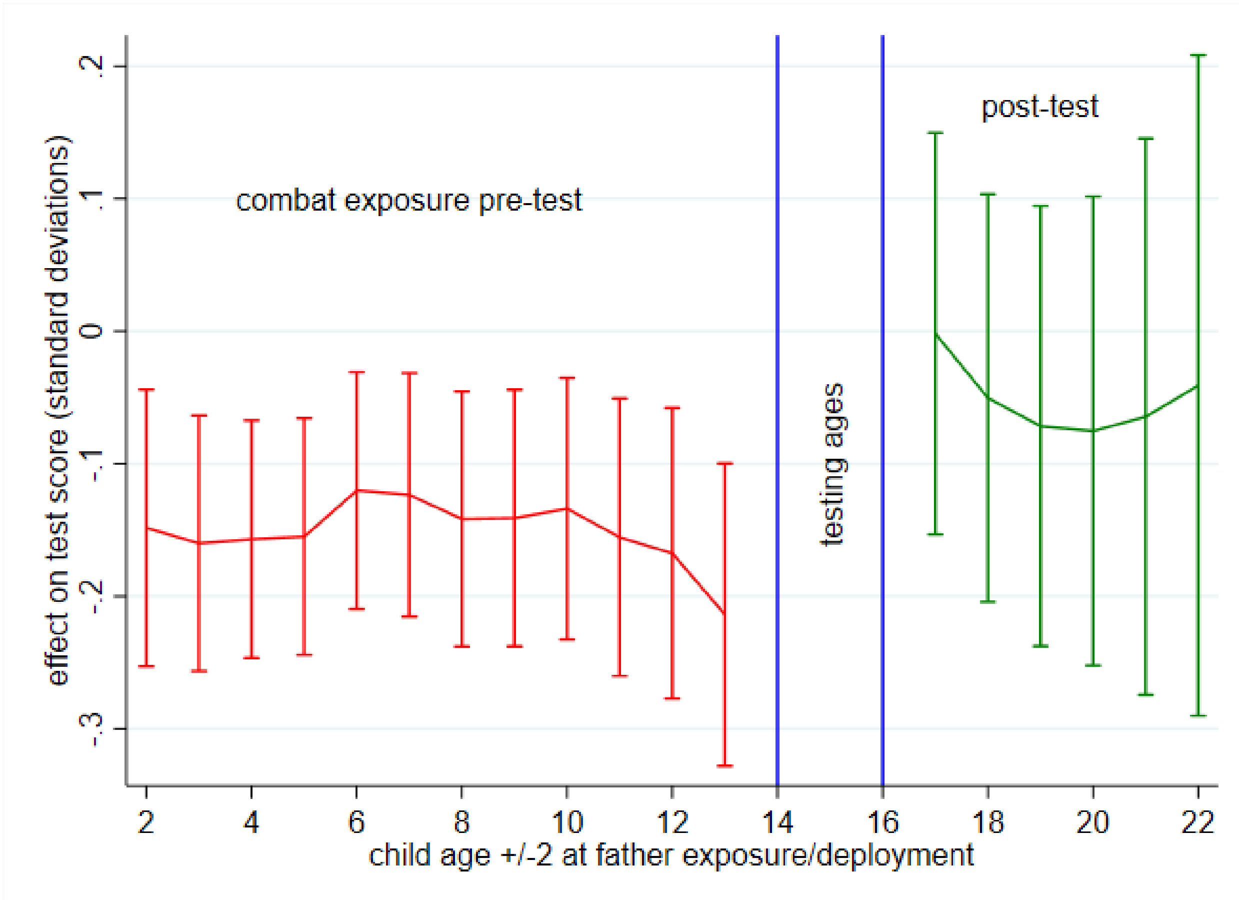

FIGURE 3. Combat Exposure Effects on Test Scores by Child Age at First Exposure

Notes: When we use the same specification as in column 2 of Table 7, the figure shows combat exposure indicator coefficients from OLS regressions explaining test scores. The line shows point estimates when we use the same sample from the same column, restricted to rolling two-year windows of child age at father's first combat exposure or deployment. Shaded bands indicate 95 percent confidence intervals. The vertical lines indicate typical 9th grade testing age between 14 and 16; left of the lines indicates father's first exposure or deployment before the child is tested; right of the lines indicates father's first exposure or deployment after the child was tested.

To further explore heterogeneity by age at exposure, we split the sample by the child's sex and test subject (see Figure A.4 in the Appendix). While daughters are most affected by combat exposure right before the test, sons are most affected by exposure pre-school. Although test scores for Danish are similarly affected by combat exposure at any pre-test age, math scores are most affected by exposure in the years up to the test. We find no obvious differences in age profiles by assessment method of the test (not shown).

D. Robustness

We have coded combat exposure as a binary indicator taking the value one if a father is recorded in military communications to have been exposed to any of the six different types of SEs related to combat. As several coding choices might affect our findings, this subsection examines the sensitivity of estimates to these choices in three ways. First, we re-estimate the model after dropping men affected by different types of combat-related events. Second, to check whether an individual being mentioned in military communications *per se* affects test scores, we use events associated with individuals mentioned in military communications but not as combat related, and regress test scores on these non-combat-related events. Third, to analyze the intensive margin in terms of number of combat exposures, we recode combat exposure as two dummy variables: one indicator for having experienced a single combat event only, and another for having experienced two or more.

TABLE 9—Combat Exposure and Test Scores: Sensitivity to Event Exclusions

	Combat measures			Other measures		
	(1)	(2)	(3)	(4)	(5)	(6)
Excluding:	Attack	TIC	IED	Minor Injury	WIAKIA	Repatriated
Combat exposure	-0.122	-0.129	-0.156	-0.104	-0.124	-0.114
	(0.0398)	(0.040)	(0.039)	(0.041)	(0.038)	(0.038)
Mean dep. var.	0.020	0.024	0.021	0.040	0.021	0.027
Mean exposure	0.335	0.326	0.341	0.339	0.362	0.354
R^2	0.174	0.181	0.181	0.192	0.178	0.178
Fathers	1,285	1,272	1,300	1,149	1,339	1,282
Children	2,152	2,124	2,173	1,901	2,233	2,148
Observations	29,183	28,868	29,499	25,838	30,306	29,163

Notes: The sample includes children born 1986-2004 who are resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Afghanistan or Iraq in 2003-2012. We restrict the sample to children with available test scores. Columns 1-3 drop children of fathers who experienced three specific types of combat events: (1) attack, (2) troops in contact, and (3) improvised explosive device. Columns 4-6 drop children of fathers who experienced other events: (4) minor injury (requiring registered medical attention), (5) removing the seven fathers wounded or killed in action, and (6) repatriated before the end of their mission. The dependent variable is the standardized test score. Combat exposure is an indicator variable, with a value of one if the father was exposed to a combat event and zero otherwise. Other variables included in the regressions but not shown are the same as in column 3 of Table 5. Observations are test scores weighted by child. Standard errors clustered by father in parentheses.

As single types of events may be driving our overall findings, we exclude men exposed to specific event types to check for this possibility. In Table 9, columns 1-3, we drop men subject to each of the three most frequent types of events mentioned in military communications. In columns 4-6, we drop men with combat exposure recorded elsewhere in the military administration. The table shows that the estimates are robust to excluding men exposed according to these six types of combat events, with effect sizes varying between 10 and 16 percent.

Thus far we have analyzed combat exposure effects based on individuals exposed to combat events. However, any mention in military communications may affect test scores, regardless of the type of event. We classify the events from military communications to which we have research access into two groups of event types, according to whether an individual is identified in connection with a combat event or a non-combat event. Using non-combat events as the variable of interest in Table 10, we replicate the analysis of Table 7. Table 10 shows that exposure to non-combat events does not affect test scores. Thus we find support for using military communications classified as combat exposure, rather than other types of communications.

TABLE 10—Father Non-Combat Events and Test Scores

			Sex		Assessment		Subject	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tested	All tests	Female	Male	Teacher	Exam	Danish	Math
Non-Combat Event	-0.009	0.021	0.106	-0.123	0.016	0.032	0.025	0.074
	(0.024)	(0.065)	(0.086)	(0.092)	(0.067)	(0.069)	(0.073)	(0.072)
Mean dependent variable	0.928	0.022	0.155	-0.119	0.041	0.019	0.049	-0.015
Mean exposure	0.094	0.091	0.093	0.088	0.091	0.091	0.091	0.091
R^2	0.092	0.175	0.213	0.200	0.175	0.143	0.151	0.190
Fathers	1,401	1,346	902	848	1,335	1,337	1,343	1,337
Children	2,419	2,245	1,156	1,089	2,224	2,226	2,238	2,231
Observations	2,419	30,459	15,726	14,733	16,072	14,387	19,034	11,425

Notes: The sample includes children born 1986-2004 who are resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Afghanistan or Iraq in 2003-2012. Columns 2-8 are restricted to children with a 9th-grade test score in Danish or math. Columns 3-8 further split the test score sample according to the child's sex, assessment method, and test subject. Each column shows estimates from separate OLS regressions. In column 1 the dependent variable is an indicator taking the value 1 if a test score is observed for the child, and 0 otherwise. In columns 2-8, the dependent variable is the standardized test score. Non-combat event is an indicator taking the value 1 if the father was exposed to a non-combat event, conditional on his never being exposed to a combat event, and 0 otherwise. For columns 2-8, other variables included in the regressions but not shown are similar to those in column 3 of Table 5. For column 1, other variables included in the regressions but not shown are the same as in column 3 of Table 5, with test-related variables added. Observations are per child in column 1, and test scores are weighted by child in columns 2-8. Standard errors clustered by father in parentheses.

We supplement the average estimates in Table 10 with a placebo analysis of the effects of exposure to non-combat events by child age around the time of the father's exposure.[12] In the same way that we graphed combat exposure effects by child age in Figure 3, we graph effects by child's age of first non-combat event exposure in Figure A.6. Estimates of the effects of non-combat are not significant at any age and imprecisely estimated.

Thus far we have coded combat exposure as a binary outcome, focusing on the extensive margin of whether or not a father experiences combat. However, as many fathers experience several combat events, a dose-response relationship may exist, with the number of combat events also affecting test scores. In Table A.3 we code combat exposure as either experiencing only a single event or more than one combat event. Experiencing a combat event only once has the largest effect on test scores, causing an 18 percent of a standard deviation drop in test scores, compared to a 10 percent drop for two or more events. As the first combat exposure may have caused the father to leave the military, before experiencing another such event, selection may likely explain what at first glance appears a counterintuitive finding. Similarly, soldiers with more deployments likely experienced multiple combat events—and may also be more resilient.

Notwithstanding the selection issues regarding interpretation of the distinction between the effects of single and multiple combat events, we can explore the variation in these effects by child's age at the father's first combat exposure. Figure A.5 shows that single exposure effects increase in magnitude throughout childhood, with a decrease in test scores of 40 percent of a standard

[12]Figure A.1 shows the age distribution of the children of fathers exposed exclusively to non-combat events.

deviation for single exposure at age 13. We can rule out decreases of less than 20 percent of a standard deviation. The effect of multiple combat exposures is smaller and insignificant at some ages, regardless of whether the child's age is measured at the first or second exposure (not shown).

Taken together, our robustness checks for coding combat exposure suggest that inclusions and exclusions from our definition do not change the findings. Moreover, military communications per se are not driving the results. Consequently, modeling the extensive margin of combat exposure is a parsimonious choice that is not subject to selection issues affecting the intensive margin.

E. Mechanisms—Mental Health Outcomes

One possible mechanism driving the effects of fathers' combat exposure on children's test scores is the impact of combat exposure on the parent's mental health, in turn impacting the children's mental health outcomes and possibly explaining their lower test scores.[13] In this section, we present findings on the impact of the father's combat exposure on both his mental health and that of his family. In Table 11, we investigate the use of mental health services—psychiatric hospitalization, contact with psychologists and psychiatrists outside of a hospital setting—suicide attempts, and the purchase of psychotropic medication.

[13] We do not have information about military-provided psychological treatments. As the military has no hospitals, they refer the most serious cases to the public health care system.

TABLE 11—Combat Exposure and Family Mental Health

	(1) Psychiatric Hospitalization	(2) Substance Abuse Diagnosis	(3) PTSD Diagnosis	(4) Psychologist Contact	(5) Psychiatrist Contact	(6) Suicide Attempt	(7) Psychotropic Medication
Panel A: Father outcomes							
Combat exposure	0.017	***0.018***	0.014	–	–	–	0.000
	(0.296)	(0.006)	(0.014)	–	–	–	(0.985)
R^2	0.033	0.011	0.029	–	–	–	0.026
Mean of dep var	0.101	0.014	0.065	–	–	–	0.237
Observations	1,401	1,401	1,401	–	–	–	1,401
Panel B: Mother outcomes							
Combat exposure	0.031	-0.000	–	0.019	-0.001	0.005	-0.015
	(0.016)	(0.006)	–	(0.022)	(0.015)	(0.007)	(0.027)
R^2	0.011	0.012	–	0.002	0.007	0.007	0.010
Mean of dep var	0.101	0.013	–	0.204	0.082	0.019	0.425
Observations	1,498	1,498	–	1,498	1,498	1,498	1,498
Panel C: Child outcomes							
Son of exposed	0.031	0.001	-0.002	0.004	-0.011	-0.007	0.014
	(0.023)	(0.005)	(0.002)	(0.015)	(0.010)	(0.007)	(0.023)
Daughter of exposed	-0.002	0.002	-0.002	0.005	***0.034***	0.015	-0.012
	(0.024)	(0.005)	(0.004)	(0.020)	(0.012)	(0.010)	(0.024)
Son	**-0.052**	0.001	-0.005	**-0.073**	0.014	-0.002	***-0.048***
	(0.017)	(0.004)	(0.003)	(0.014)	(0.009)	(0.007)	(0.019)
R^2	0.026	0.039	0.024	0.059	0.047	0.026	0.036
Mean of dep var	0.157	0.006	0.003	0.086	0.033	0.021	0.170
Observations	2,419	2,419	2,419	2,419	2,419	2,419	2,419

Notes: The sample includes parents of children born 1986-2004 who are residents in Denmark on January 1 of each year through age 16. Both parents are born 1955-1985 and the father was deployed in Afghanistan or Iraq in 2003-2012. The table shows the result of estimating equation 3. Each column in each panel shows estimates from separate OLS regressions. Panels B and C give parents. Each column has a different dependent variable, which is an indicator taking the value 1 if the mental health outcome is registered after a combat event (or after the first deployment in the absence of a combat event), and 0 otherwise. Combat exposure is an indicator variable taking the value one if the father was exposed to a combat event, and 0 otherwise. Son and daughter of exposed are indicator variables interacting combat exposure with male and female child indicators, respectively. Substance abuse diagnosis includes alcohol abuse and dependence (F10.1, F10.2 and F10.3), and drug abuse and dependence (F11.1, F11.2, F13.1, F13.2 and F14.2). All regressions control for the rank of the father. Child regressions also control for the child's year of birth. Standard errors clustered by father in parentheses. $q < 0.05$ (bold and italic), $q < 0.010$ (bold), where q is the false discovery rate, the expected proportion of type 2 errors. To adjust for multiple comparisons, we present q-values rather than p-values and apply the generalized adaptive linear step-up procedure described in Benjamini, Krieger, and Yekutieli (2006) (definition 2).

Given that studies on mental health consequences of deployment often emphasize the comorbidity of substance abuse diagnosis and PTSD (e.g., Thomas et al., 2010; Wilk et al., 2010; Seal et al., 2011), we investigate the effect of combat exposure on these diagnoses. We find that whereas combat exposure does not cause PTSD in our sample, it causes (receiving a diagnosis of) substance abuse (Table 11, panel A, column 2). While the prevalence of PTSD in the population of those deployed in 1992-2012 is 4.9 percent (Lyk-Jensen, 2022), it is 6.4 percent among the deployed fathers of children born 1986-2004. MacManus et al. (2014), reviewing the literature on UK military deployments, conclude that soldiers have remained resilient despite prolonged combat missions in Iraq and Afghanistan. However, one exception was the high rate of alcohol misuse associated with deployment. In our study, we find that combat exposure leads to a diagnosis of substance abuse or dependence, of which alcohol misuse is a sub-set.

Interacting combat exposure with the sex of the child, Table 11 shows that combat exposure increases the likelihood of daughters of exposed fathers seeing a psychiatrist outside a hospital setting. The prevalence of mental health service use among children of the deployed shown in Table 11, Panel C is similar to that in the general population born 1986-2004 (not shown). Table 11, Panel B, shows no effects for mothers of children whose fathers were exposed to combat. In 2003-2019, mothers' prevalence of mental health service use is similar to mothers in the general population born 1955-1985 with children born 1986-2004 (not shown).

TABLE 12—Combat Exposure and Family Medication - Psychotropics and Opioids

ATC codes	(1) Antipsychotics N05A	(2) Anxiolytics N05B	(3) Tranquilizers N05C	(4) Antidepressants N06A	(5) Psychostimulants N06B	(6) Opioids N02A
Panel A: Father outcomes						
Combat exposure	0.023	0.005	0.003	0.004	–	0.033
	(0.014)	(0.013)	(0.018)	(0.020)	–	(0.026)
R^2	0.026	0.009	0.006	0.033	–	0.009
Mean of dep var	0.064	0.054	0.109	0.161	–	0.324
Observations	1,401	1,401	1,401	1,401	–	1,401
Panel B: Mother outcomes						
Combat exposure	0.013	-0.009	-0.026	0.018	-0.002	-0.021
	(0.015)	(0.019)	(0.022)	(0.025)	(0.008)	(0.027)
R^2	0.006	0.006	0.003	0.016	0.005	0.009
Mean of dep var	0.083	0.139	0.206	0.309	0.023	0.406
Observations	1,498	1,498	1,498	1,498	1,498	1,498
Panel C: Child outcomes						
Son of exposed	0.025	-0.003	*0.030*	0.011	-0.006	0.035
	(0.014)	(0.010)	(0.016)	(0.015)	(0.015)	(0.018)
Daughter of exposed	0.0082	-0.0018	-0.0135	0.015	-0.006	0.046
	(0.014)	(0.011)	(0.016)	(0.019)	(0.012)	(0.021)
Son	-0.010	-0.010	**-0.042**	**-0.049**	*0.019*	*-0.031*
	(0.010)	(0.009)	(0.013)	(0.013)	(0.011)	(0.015)
R^2	0.029	0.018	0.019	0.068	0.015	0.060
Mean of dep var	0.049	0.031	0.070	0.079	0.049	0.104
Observations	2,419	2,419	2,419	2,419	2,419	2,419

NOTE.— The sample includes parents of children born 1986-2004 who are resident in Denmark on January 1 of each year through age 16. The parents are born 1955-1985 and the fathers were deployed in Afghanistan or Iraq in 2003-2012. The table shows the result of estimating equation 3. Each column within each panel presents estimates from separate OLS regressions. Panels B and C give parent outcomes. Each column has a different dependent variable, which is an indicator taking the value 1 if the medication is purchased after a combat event (or after first deployment in the absence of a combat event), and 0 otherwise. Combat exposure is an indicator variable taking the value 1 if the father was exposed to a combat event, and 0 otherwise. Son and daughter of exposed are indicator variables interacting combat exposure with male and female child indicators, respectively. Child regressions also control for the child's year of birth. Standard errors clustered by father in parentheses. q < 0.10 (italic), q < 0.010 (bold), where q is the false discovery rate, the expected proportion of type 2 errors. To adjust for multiple comparisons, we present q-values rather than p-values and apply the generalized adaptive linear step-up procedure described in Benjamini, Krieger, and Yekutieli (2006) (definition 2).

To further investigate the effect of combat exposure on family members, we explore the purchase of specific psychotropic medications and opioids. Table 12, Panel C, shows that children—especially sons—of combat-exposed fathers are more likely to purchase tranquilizers.[14] Table 12,

[14]Children of the deployed purchase less medication than similarly aged children in the general population.

Panels A and B, show no significant effects for mothers or fathers, respectively. No effect for the fathers could reflect either a healthy warrior effect (Larson, Highfill-McRoy and Booth-Kewley, 2008) or help-seeking behavior with a generally lower use of mental health services (Møller et al., 2020).

In contrast to test scores, mental health outcomes are observed at different ages, enabling us to measure dynamic effects by accumulating individual outcomes over time. We estimate dynamic difference-in-differences for children with exposed and non-exposed fathers measured from three years before the event to five years afterwards (in the age range of 4-18). Due to the limited number of observations per year, we group all psychiatric diagnoses. In Figure 4, we investigate the effect of deployed father's combat exposure on the mental health of their children and the children's mothers. We observe that both mothers' and children' rates of psychiatric diagnoses and hospitalizations begin to rise following fathers' combat exposure, becoming significant from four years after exposure for children and five years after exposure for mothers, compared to families with deployed but not exposed fathers. We find no differences in these dynamics by the sex of the child.[15]

[15] Figure A.2 shows no significant effects for fathers and no differences in these dynamic impacts by child sex.

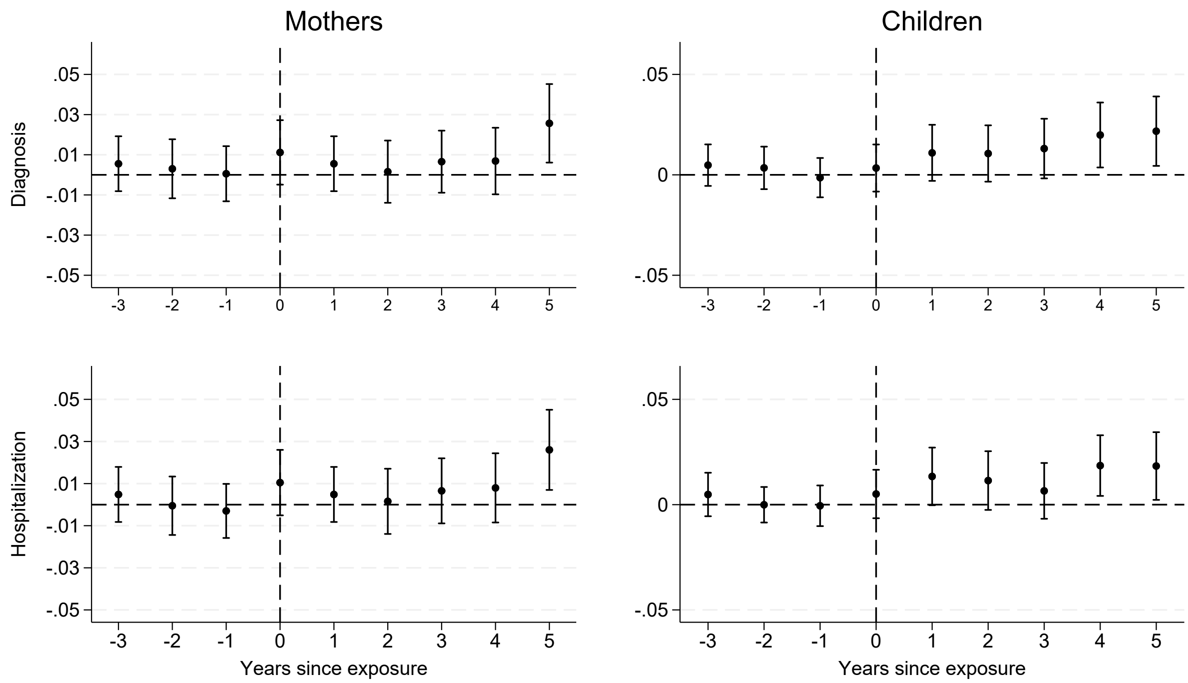

FIGURE 4. Dynamic Effects of Fathers' Combat Exposure on Mothers' and Children's Mental Health

Notes: The figure shows the result of estimating equation 4, a dynamic difference-in-differences explaining mothers and children's mental health outcomes from three years to five years after the father's combat exposure or mission start. The top panel shows the differences in having a psychiatric diagnosis (given at most psychiatric hospital discharges and by some non-hospital psychiatrists and psychologists), and the bottom panel differences in contacts to psychiatric hospitals. Results for mental health medication were not significant. The right panel shows results for children, while the left panel shows results for mothers. Each panel corresponds to a separate two-way fixed effect estimation. Restricting the sample from three years pre- to five years post-event (children aged 4-18) gives an estimation sample of 1,498 mothers with 900 sons and 931 daughters. Standard errors are clustered by father for the children. Specifications using covariates such as the father's rank, unit type, mission, and birth year produce similar figures (not shown).

F. Mechanisms–Household Composition

Household composition may be a mediator for how combat exposure affects children, or how combat exposure affects household composition, in turn possibly affecting test scores. To disentangle the role of household composition as a mechanism in the causal chain from combat exposure to test scores, this subsection focuses on combat exposure effects on parental marital status and fertility. We also investigate combat exposure effects on test scores by birth order, sex, parental marital status, and the presence of other family members.

Comparing Panels A and B in Table 13 shows how the effect of combat exposure on test scores differs by child birth order related to the total number of children of the father (paternal birth order), and the mother (maternal birth order). While effects are identical by paternal birth order, being the maternal first-born somewhat moderates effects compared to subsequent births. Either way, however, the differences are statistically insignificant.

Much more striking are the differences in combat exposure effects by cousin birth order, i.e., whether the focal child of the exposed father is the first-born grandchild. Being the first among cousins is protective against the effects of combat exposure, compared to being a later-born cousin. This protective effect is significant for all grandparents except for the father's mother, and the protective effect of the mother's parents is greater than that of the father's parents. Comparing first-born cousins with first-born siblings in Panel A of Table 13 is instructive about mechanisms because cousins are a subset of the siblings. The significantly protective effect of maternal grandparents thus drives the effect of being a mother's first-born.

TABLE 13—Effects of Combat Exposure on Focal Child Test Scores by (Grand) Child Birth Order

Birth order among	Siblings		Paternal cousins		Maternal cousins	
Relation via			Father's	Father's	Mother's	Mother's
	Mother	Father	Father	Mother	Mother	Father
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: First born children or nieces/nephews						
Combat exposure	-0.110	-0.121	-0.086	-0.096	-0.069	-0.076
	(0.047)	(0.048)	(0.053)	(0.054)	(0.055)	(0.056)
R^2	0.209	0.207	0.229	0.222	0.222	0.228
Mean of the dependent variable	0.051	0.046	0.036	0.044	0.038	0.035
Fathers	1,131	1,190	933	945	844	827
Children	1,186	1,190	933	945	873	855
Observations	16,117	16,166	12,695	12,846	11,900	11,636
Panel B: Later born children or nieces/nephews						
Combat exposure	-0.151	-0.122	-0.137	-0.133	-0.159	-0.170
	(0.051)	(0.053)	(0.047)	(0.047)	(0.045)	(0.046)
R^2	0.217	0.211	0.198	0.198	0.204	0.198
Mean of the dependent variable	0.012	0.017	0.030	0.024	0.029	0.031
Fathers	852	814	933	927	985	990
Children	1,059	1,055	1,312	1,300	1,372	1,390
Observations	14,342	14,293	17,764	17,613	18,559	18,823
Panel C: Has younger siblings or cousins						
Combat exposure	-0.055	-0.091	-0.074	-0.111	-0.099	-0.068
	(0.051)	(0.052)	(0.051)	(0.050)	(0.050)	(0.048)
R^2	0.196	0.197	0.192	0.188	0.205	0.208
Mean of the dependent variable	0.057	0.079	0.076	0.066	0.049	0.042
Fathers	904	881	908	919	903	893
Children	1,117	1,108	1,190	1,197	1,157	1,150
Observations	15,303	15,195	16,276	16,402	15,815	15,724
Panel D: No younger siblings or cousins						
Combat exposure	-0.187	-0.146	-0.171	-0.135	-0.163	-0.201
	(0.048)	(0.048)	(0.050)	(0.052)	(0.052)	(0.053)
R^2	0.210	0.207	0.216	0.222	0.210	0.208
Mean of the dependent variable	0.008	-0.014	-0.017	-0.007	0.015	0.022
Fathers	1,076	1,116	948	947	950	955
Children	1,128	1,137	1,055	1,048	1,088	1,095
Observations	15,156	15,264	14,183	14,057	14,644	14,735

Notes: The sample includes children born 1986-2004 who are resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Afghanistan or Iraq in 2003-2012. Each column in each panel gives estimates from separate OLS regressions with dependent variable standardized test score, with the covariate of interest combat exposure taking the value 1 if the father has been exposed to a combat event, and 0 otherwise. Panels give estimates from samples split by different views of birth order, with A-B splitting by first-born status, and C-D splitting by last-born status. Columns 1-2 rank birth order among siblings; columns 3-6 among cousins. We do not observe uncles or aunts born before 1955 because of incomplete (grand)parental links. Thus we might also not observe some cousins who are children of these un-matched pre-1955 uncles and aunts. We use the terms "first-born cousin/grandchild" to represent first-born observed cousin/grandchild. Other variables included in the regressions are the same as in column 1 (2) of Table 7 for Panels C-E (A and B). Standard errors clustered by father in parentheses.

A complementary way of examining combat exposure effects by birth order is splitting the sample by whether the focal child is the last-born child or grandchild. Panels C and D of Table 13 show that having younger siblings is protective against combat exposure effects, although only significantly protective for maternal younger siblings. Youngest grandchildren are the least protected from combat exposure effects, with grandfathers significantly protecting older grandchildren.

Another dimension of potentially supportive family relations is aunts and uncles and the sex of siblings. Panel A of Table 14 shows that the negative effect of combat exposure on test scores is accentuated if the focal child has a sister. Point estimates of effects for children with paternal aunts and uncles, although insignificant, are somewhat more negative than for children with maternal aunts or uncles. One explanation is that the soldier's siblings may be more affected than siblings-in-law, with this effect spilling over to the focal child.

Splitting the sample by the sex of the child in Panels B and C of Table 14 shows that same-sex siblings protect girls from combat exposure effects. For girls, aunts accentuate combat exposure effects, whereas for boys, maternal uncles are protective. Household composition clearly either moderates or accentuates the effect of fathers' combat exposure on children's test scores. While the existence of uncles and aunts is obviously exogenous, fertility could be endogenous. Therefore, we next examine whether combat exposure affects fertility, i.e., whether fertility is a link in the causal chain from combat exposure to test scores.

TABLE 14—Effects of Combat Exposure on Test Scores by existence of Relatives

Relation	Maternal and Paternal		Paternal		Maternal	
	Brothers	Sisters	Uncles	Aunts	Uncles	Aunts
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All children						
Combat exposure	-0.133	-0.226	-0.182	-0.161	-0.132	-0.127
	(0.066)	(0.067)	(0.048)	(0.047)	(0.048)	(0.053)
R^2	0.257	0.276	0.204	0.209	0.196	0.227
Mean of the dependent variable	-0.014	0.008	0.003	0.033	0.038	0.028
Fathers	509	487	784	757	833	738
Children	654	590	1,307	1,265	1,358	1,219
Observations	8,817	8,033	17,735	17,234	18,463	16,536
Panel B: Male children						
Combat exposure	0.005	-0.348	-0.171	-0.138	-0.031	-0.136
	(0.108)	(0.118)	(0.071)	(0.068)	(0.068)	(0.070)
R^2	0.387	0.410	0.253	0.253	0.250	0.263
Mean of the dependent variable	-0.151	-0.103	-0.134	-0.109	-0.102	-0.108
Fathers	254	242	489	482	501	477
Children	304	266	636	619	633	617
Observations	4,082	3,627	8,613	8,369	8,592	8,361
Panel C: Female children						
Combat exposure	-0.229	-0.107	-0.147	-0.197	-0.123	-0.186
	(0.085)	(0.090)	(0.064)	(0.067)	(0.066)	(0.075)
R^2	0.317	0.337	0.271	0.257	0.240	0.282
Mean of the dependent variable	0.103	0.100	0.132	0.168	0.159	0.167
Fathers	311	294	534	500	572	480
Children	350	324	671	646	725	602
Observations	4,735	4,406	9,122	8,865	9,871	8,175

Notes: The sample includes children born 1986-2004 who are resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Afghanistan or Iraq in 2003-2012. Each column in each panel gives estimates from separate OLS regressions with dependent variable standardized test score, with the covariate of interest combat exposure taking the value 1 if the father has been exposed to a combat event, and 0 otherwise. Panels represent samples of (A) all children, (B) only males, (C) only females. Columns represent sub-samples of the panel for children with (1) brothers, (2) sisters, (3) paternal uncles, (4) paternal aunts, (5) maternal uncles, (6) maternal aunts. We do not observe uncles and aunts born before 1955 because of incomplete (grand)parental links. Other variables included in the regressions are the same as in column 1 (2) of Table 7 for Panels C-E (A and B). Standard errors clustered by father in parentheses.

Combat exposure does not significantly affect the number of children born to deployed fathers in our sample (see Appendix Figure A.3). Table 5 shows that combat exposure is balanced for the number of children (siblings and half-siblings to the focal child). Nonetheless, as we are conditioning on having at least one child in our selected birth cohorts, we cannot discuss fertility for deployed men more generally. For mothers who are co-parents with the deployed fathers, combat exposure does not affect the number of children born.

To explore the relationships between combat exposure, marital status, and test scores, in Table 15 we use exposure over five-year child age intervals. Panels A and B show the effects of combat exposure on test scores during these age intervals, according to parental marital status at the end of each interval. We see that whereas households with parents not married to each other drive the effects, no effects of combat exposure appear for married parents. Moreover, effects are strongest for exposure up to age five but become insignificant after age 10. Test score estimates split by whether parents live together show the same pattern (not shown).

TABLE 15—Child Test Scores and Parental Marital Status by Child Exposure Age Group (Five-Year intervals)

	(1) Age 1-5	(2) Age 6-10	(3) Age 11-15	(4) Age 16-20
Panel A. Outcome: Test scores. Sample: Parents married with each other				
Combat exposure	-0.129	0.013	-0.012	-0.002
	(0.083)	(0.075)	(0.100)	(0.170)
Mean of the dependent variable	0.174	0.094	0.085	0.034
R^2	0.168	0.218	0.207	0.259
Fathers	337	429	315	164
Children	401	531	401	216
Observations	5,257	7,091	5,702	3,071
Panel B. Outcome: Test scores. Sample: Parents not married to each other				
Combat exposure	-0.305	-0.197	-0.162	0.049
	(0.147)	(0.106)	(0.113)	(0.142)
Mean of the dependent variable	-0.136	-0.098	-0.037	-0.126
R^2	0.362	0.263	0.270	0.300
Fathers	153	267	236	138
Children	167	325	291	172
Observations	2,120	4,268	4,056	2,430
Panel C. Outcome: Parents married to each other.				
Combat exposure	0.092	-0.053	-0.121	-0.197
	(0.045)	(0.046)	(0.057)	(0.094)
Mean of the dependent variable	0.687	0.616	0.571	0.543
R^2	0.412	0.288	0.308	0.389
Fathers	490	696	551	302
Children	568	856	692	388
Panel D. Outcome: Parents living together.				
Combat exposure	0.035	-0.059	-0.126	-0.222
	(0.042)	(0.046)	(0.057)	(0.092)
Mean of the dependent variable	0.787	0.648	0.600	0.570
R^2	0.362	0.278	0.316	0.415
Fathers	490	696	551	302
Children	568	856	692	388
Panel E. Outcome: Parents divorced.				
Combat exposure	0.017	0.011	0.061	-0.036
	(0.031)	(0.027)	(0.029)	(0.035)
Mean of the dependent variable	0.079	0.095	0.074	0.046
R^2	0.188	0.199	0.198	0.371
Fathers	490	696	551	302
Children	568	856	692	388

Notes: The sample includes children born 1986-2004 who are resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Afghanistan or Iraq in 2003-2012. Each column in each panel gives estimates from separate OLS regressions. Columns represent parental marital or cohabitation status at different child ages. Samples are where the father was exposed to a combat event in the previous five years or was first deployed in the previous five years and never exposed to a combat event. Samples are further restricted to children with a valid test score. Panels A and B have dependent variable test scores at age 15, splitting the sample by parental marital status at different child ages. Panels C and D have dependent variable parental cohabitation and marital status at different child ages. Panel E has the dependent variable divorce, taking the value 1 if parents transition from married together to divorced in the previous five years, and 0 otherwise. Other variables included in the regressions are the same as in column 1 (2) of Table 7 for Panels C-E (A and B). Standard errors clustered by father in parentheses.

Panels C and D of Table 15 show that combat exposure during five-year age intervals reduces the probability of parents being married or living together (household togetherness) when the child is ages 15 and 20, with effects of similar magnitude regardless of the household togetherness measure. However, at age five, combat exposure increases the probability that parents are married to each other, but does not affect the probability of living together. This contrast in exposure effects is consistent with incentives in military life insurance policies, i.e., that spouses of deceased soldiers can receive widow's pensions but cohabiting partners may not.[16]

Panel E of Table 15 shows that the father's combat exposure when the child is aged 11-15 increases the probability that the parents will be divorced by the time the child is 15 by six percentage points, accounting for 80 percent of divorces in this age range. However, there are no effects of combat exposure on divorce at other ages. We find a similar pattern of combat exposure effects by child age on parental separation (not shown). Given that the testing age is 15 years, that the causal chain between combat exposure and test scores runs through parental divorce or separation may be plausible. However, that we find combat exposure effects on test scores at younger ages but not on household dissolution suggests a direct causal link between combat exposure and test scores.

V. Conclusion

We follow Danish families after father's exposure to potentially traumatizing events during military deployment. By combining classified military communications about events involving deployed fathers with administrative data about these men and their families, we show that, among the deployed and conditional on mission and rank, exposure to combat is uncorrelated with predetermined characteristics. We use this conditionally random combat exposure at the individual soldier level to identify the causal effect of fathers' combat exposure on their families.

We find that military deployment of fathers *per se* is not associated with differences in children's test scores on the nationwide tests at the end of compulsory school, around age 15. However, among the deployed, combat exposure causes a significant reduction in child test scores compared to those of children of deployed fathers not exposed to combat, with an effect size of 13 percent of a standard deviation. Our results are robust to several falsification tests, considering fathers' combat exposure after children's tests are taken, and events unrelated to combat but mentioned in military communications.

Exploring heterogeneity, we find substantive differences in the effects of combat by the child's age at exposure. Combat exposure effects are large pre-school and then again right before test

[16]The Occupational Injuries Insurance Act stipulates that both married or cohabiting couples are eligible for compensation for loss of partner earnings if their partner is injured or dies during service (Section 20). Although the definition of cohabitation changed in the 1990s from five years to two years, only a surviving spouse is eligible for a lifetime benefit (Personnel Act, Section 11b).

taking, causing a drop in test scores of 20 percent of a standard deviation. Sons are most affected by their fathers' combat exposure during primary school, whereas daughters are most affected by exposure pre-school and right before testing.

Investigating possible mechanisms for our test score findings by analyzing family mental health, we find significant effects for several indicators. Combat-exposed fathers are more likely to receive treatment for substance abuse but not more likely to be diagnosed with PTSD. For other family members, combat exposure causes daughters to see psychiatrists more often, and sons to be more likely to be prescribed tranquilizer.

For effects on and by family composition, we find none for combat exposure on fertility. Having parents married or living together is an effective mediating factor, protecting children from the significantly negative test score effects due to father's combat exposure for children with unmarried parents or parents not living together. That combat exposure increases the likelihood of parents living apart when the child is age 15 likely reduces test scores. However, that combat exposure at a child's younger ages also affects test scores, without affecting whether the parents live together at these ages, suggests direct effects of combat exposure on test scores—effects not necessarily mediated by household composition changes.

A final striking finding is the importance of siblings and relatives living outside the household in either moderating or accentuating the effects of combat exposure on test scores. Sisters accentuate combat exposure effects, as do paternal aunts and uncles. Same-sex siblings protect against these effects. Grandparents protect against the effects of combat exposure for their first-born grandchildren, and grandfathers protect against the effects of combat exposure for all but their youngest grandchildren.

Our findings speak to the broader literature on indirect exposure to trauma or secondary trauma victims. Outside the military, first responders, police officers, and healthcare providers are frequently exposed to traumatic scenes and injured individuals. Family members of crime victims may experience secondary trauma in the aftermath of an accident, assault, or other violent crime. In communities affected by violence, poverty, or natural disasters, individuals may not experience trauma firsthand but can be affected by constant exposure to others' suffering.

These findings underscore the need to broaden our understanding of trauma to include its indirect effects on families, friends, and bystanders, as well as professionals repeatedly exposed to distressing situations. By recognizing that secondary trauma can permeate various facets of social and professional life, practitioners and policymakers can devise comprehensive strategies—ranging from family-focused therapeutic programs to community-wide interventions—to address and mitigate these often-overlooked consequences.

Our results have implications for assessing the costs of deployment in general and of exposure to combat in particular. Given that the impact of combat exposure is transmitted to other family members, a clear policy implication for health and social authorities is that they create programs that mitigate the effects of parental trauma on indirectly exposed children.

Future research should concentrate on identifying which preventive measures, resilience-building initiatives, and support networks most effectively shield vulnerable groups from the lasting impacts of indirect trauma. Through such efforts, we can ensure that responses to traumatic events go beyond immediate victims and extend to the wider circle of individuals who experience its reverberations.

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Appendix for Online Publication

A. Additional Tables and Figures

TABLE A.1—Balancing Tests for Exposure to Combat and Non-Combat Events - Continued

	Combat			Non-combat		
	(1)	(2)	(3)	(4)	(5)	(6)
Mother high school		0.0251	0.0149		0.00478	0.00528
		(0.0301)	(0.0305)		(0.0183)	(0.0185)
Mother college		0.00575	-0.0120		0.00295	0.00413
		(0.0380)	(0.0388)		(0.0231)	(0.0236)
Mother's mother HS		-0.0447*	-0.0427		0.00329	0.00275
		(0.0267)	(0.0267)		(0.0162)	(0.0162)
Mother's mother col.		0.0169	0.0180		0.0204	0.0198
		(0.0396)	(0.0396)		(0.0240)	(0.0241)
Mother's father HS		-0.00876	-0.00615		-0.0198	-0.0202
		(0.0256)	(0.0256)		(0.0155)	(0.0156)
Mother's father col.		0.0352	0.0377		-0.0512**	-0.0531**
		(0.0379)	(0.0380)		(0.0230)	(0.0231)
Mother's brothers		0.0149	0.0153		-0.00812	-0.00768
		(0.0148)	(0.0148)		(0.00895)	(0.00898)
Mother's sisters		-0.00401	-0.00273		-0.00596	-0.00634
		(0.0141)	(0.0141)		(0.00855)	(0.00857)
Child male			-0.0208			0.00902
			(0.0243)			(0.0148)
Child's brothers			-0.0301			0.0101
			(0.0211)			(0.0129)
Child's sisters			-0.0300			0.00180
			(0.0227)			(0.0138)
Child's half-sibs			-0.0284			-0.000461
			(0.0218)			(0.0132)
F-Statistic	0.748	0.886	1.090	0.290	0.525	0.485
F-Stat p-value	0.665	0.591	0.352	0.978	0.942	0.976
Partial-R^2	0.00522	0.0117	0.0177	0.00203	0.00695	0.00794
Observations	1401	1401	1401	1401	1401	1401

Notes: Continuation of Table 5 presenting additional covariates not shown in the main text. The sample contains men born 1955-1985, and deployed to Iraq or Afghanistan in 2003-2012. These men are fathers of children born 1986-2004. These children are resident in Denmark on January 1 of each year until age 16. Columns present coefficients from different OLS regressions. The dependent variable for columns 1-3 is an indicator taking the value 1 if the father was exposed to a combat event while deployed, and 0 otherwise. The dependent variable for columns 4-6 is an indicator taking the value 1 if the father was exposed to a non-combat event, conditional on his never being exposed to a combat event, and the value 0 otherwise. Additional controls included but not shown are dummies for mission, rank (private, sergeant, officer, other), unit type (combat, support, staff, other), year of birth of father and mother (columns 2, 3, 5 and 6), and year of birth of child (in columns 3 and 6). For these regressions, each father has one observation; we choose the first child born in the cohort range with the mother of this child. Standard errors in parentheses.

TABLE A.2—Grandparent Characteristics and Father Deployment Status

	All	Deployed	Iraq	Afghanistan	Combat	Support	Staff
Father's mother high school	0.251	0.318	0.270	0.361	0.309	0.315	0.328
Father's mother college	0.109	0.143	0.171	0.118	0.137	0.120	0.195
Father's father high school	0.333	0.403	0.390	0.414	0.411	0.432	0.336
Father's father college	0.125	0.162	0.171	0.154	0.119	0.118	0.273
Mother's mother high school	0.271	0.339	0.343	0.336	0.354	0.339	0.335
Mother's mother college	0.117	0.137	0.123	0.149	0.151	0.121	0.165
Mother's father high school	0.358	0.403	0.392	0.413	0.432	0.412	0.372
Mother's father college	0.130	0.146	0.148	0.143	0.137	0.119	0.206
Mother's brothers	0.792	0.802	0.835	0.772	0.814	0.812	0.775
	(0.874)	(0.789)	(0.807)	(0.772)	(0.730)	(0.780)	(0.832)
Mother's sisters	0.726	0.723	0.714	0.732	0.775	0.712	0.727
	(0.852)	(0.812)	(0.860)	(0.766)	(0.895)	(0.786)	(0.831)
Father's brothers	0.791	0.814	0.767	0.857	0.786	0.825	0.805
	(0.897)	(0.855)	(0.839)	(0.867)	(0.778)	(0.859)	(0.875)
Father's sisters	0.700	0.736	0.711	0.759	0.814	0.762	0.649
	(0.822)	(0.779)	(0.786)	(0.772)	(0.858)	(0.783)	(0.727)
Mother's half-siblings	0.298	0.341	0.327	0.353	0.375	0.348	0.310
	(0.890)	(0.897)	(0.877)	(0.915)	(0.870)	(0.887)	(0.930)
Father's half-siblings	0.237	0.392	0.443	0.345	0.705	0.423	0.194
	(0.798)	(1.026)	(1.055)	(0.998)	(1.503)	(1.029)	(0.676)
Individuals	1,005,425	2,419	1,152	1,267	285	1,453	681

Notes: Descriptive statistics for grandparents for children born 1986-2004 who are resident in Denmark every 1 January until turning 16, with both parents born 1955-1985. Column 1 includes the grandparents of all these children. Column 2 restricts the sample to grandparents of children with a father deployed to Afghanistan or Iraq during 2003-2012. Columns 3-4 split the deployed sample by mission country, and columns 5-7 split the deployed sample by unit type. Statistics are means of indicator variables for the highest schooling level being high school or college, and means and standard deviations (in parentheses) of counts for maternal and paternal siblings. Observations are in the year before the child is born.

TABLE A.3—Multiple Combat Events and Test Scores

			Sex		Assessment		Subject	
	(1) Tested	(2) All Tests	(3) Female	(4) Male	(5) Teacher	(6) Exam	(7) Danish	(8) Math
One combat event	-0.007	-0.177	-0.152	-0.190	-0.174	-0.155	-0.209	-0.124
	(0.021)	(0.052)	(0.075)	(0.071)	(0.055)	(0.056)	(0.057)	(0.063)
More than one combat event	0.018	-0.099	-0.116	-0.074	-0.075	-0.080	-0.083	-0.106
	(0.015)	(0.043)	(0.055)	(0.062)	(0.045)	(0.043)	(0.046)	(0.050)
Mean of the dependent variable	0.928	0.022	0.155	-0.119	0.041	0.019	0.049	-0.015
Mean exposure	0.362	0.363	0.370	0.354	0.359	0.360	0.362	0.362
R^2	0.093	0.178	0.214	0.202	0.177	0.145	0.154	0.192
Fathers	1,401	1,346	902	848	1,335	1,337	1,343	1,337
Children	2,419	2,245	1,156	1,089	2,224	2,226	2,238	2,231
Observations	2,419	30,459	15,726	14,733	16,072	14,387	19,034	11,425

Notes: The sample includes children born 1986-2004 who are resident in Denmark on January 1 of each year through age 16, with parents born 1955-1985 and fathers deployed in Afghanistan or Iraq in 2003-2012. Columns 2-8 are restricted to children with a 9th-grade test score in Danish or math. Columns 3-8 further split the test score sample according to the child's sex, assessment method, and test subject. Each column gives estimates from separate OLS regressions. In column 1 the dependent variable is an indicator taking the value 1 if a test score is observed for the child, and 0 otherwise. In columns 2-8, the dependent variable is the standardized test score. One combat event is an indicator variable taking the value 1 if the father was exposed to a single combat event, and 0 otherwise. More than one combat event is an indicator variable taking the value 1 if the father was exposed to more than one combat event, and 0 otherwise. For columns 2-8, other variables included in the regressions but not shown are similar to those in column 3 of Table 5. For column 1, other variables included in the regressions but not shown are the same as in column 3 of Table 5, with test-related variables added. Observations are per child in column 1, and test scores are weighted by child in columns 2-8. Standard errors clustered by father in parentheses.

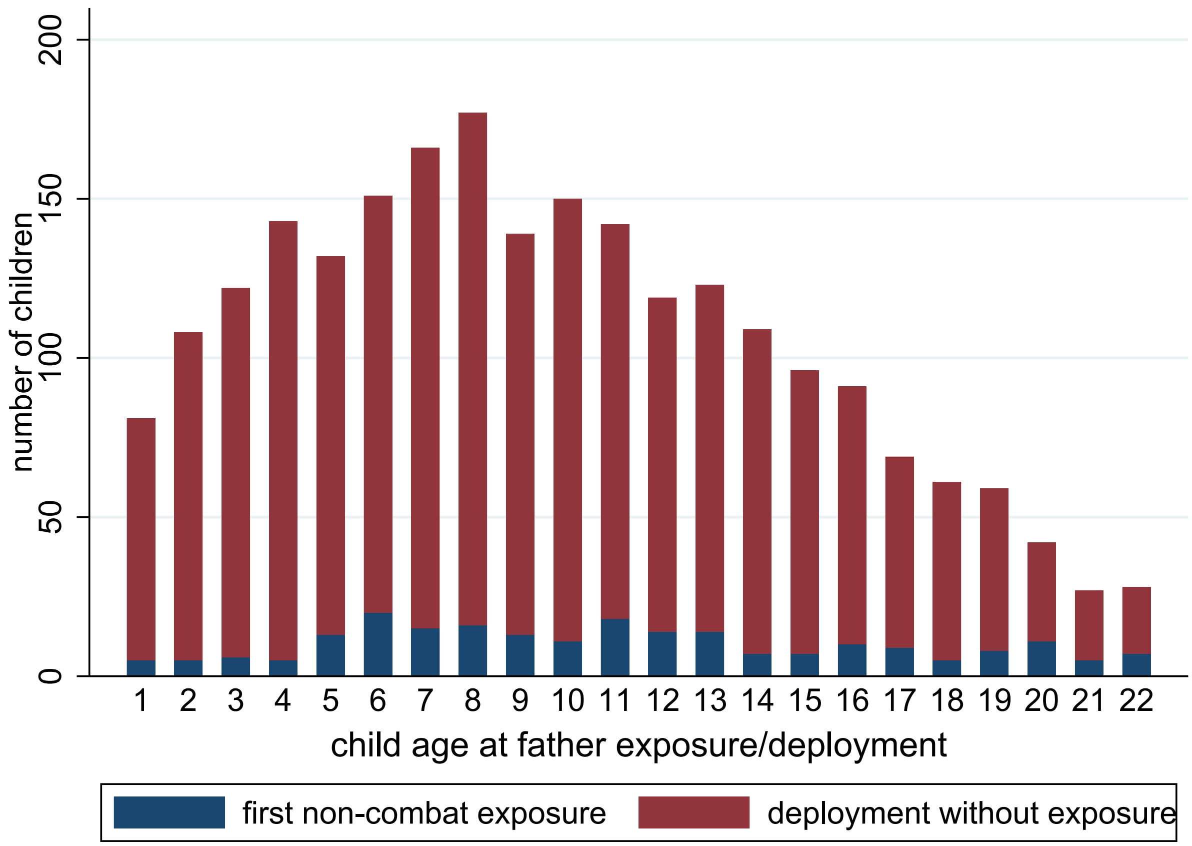

FIGURE A.1. Father First Non-Combat Event / First Deployment by Child Age

Notes: The sample includes children born 1986-2004 and residents in Denmark on January 1 through age 16, with both parents born 1955-1985 and fathers deployed to Afghanistan or Iraq in 2003-2012. Blue bars represent the number of children of a given age with a father experiencing a first non-combat event, conditional on his never being exposed to a combat event. Red bars represent the number of children of a given age with a father first deployed, conditional on his experiencing neither a combat event nor a non-combat event during the 21 missions.

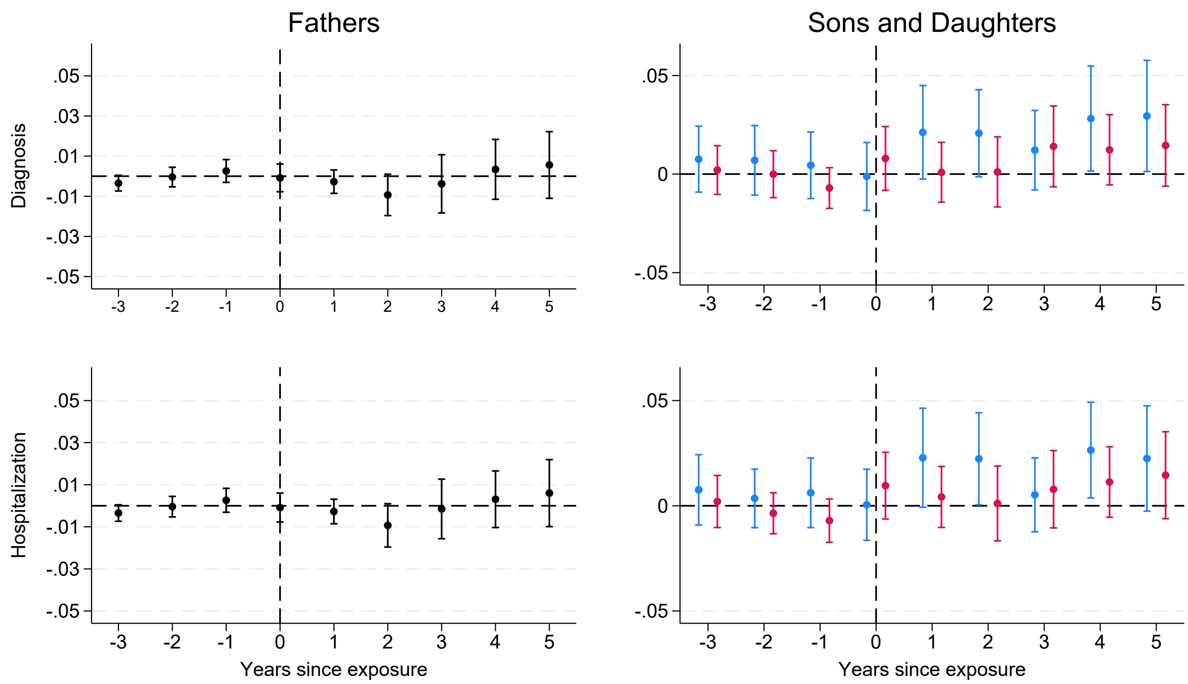

FIGURE A.2. Dynamic Effects of Combat Exposure on Fathers' Mental Health and That of Their Sons and Daughters

Notes: The figure shows the result of estimating equation 2, a dynamic difference-in-differences explaining fathers and children's mental health outcomes from three years to five years after the father's combat exposure or mission start. The top panel shows the differences in having a psychiatric diagnosis (given at most psychiatric hospital discharges and by some non-hospital psychiatrists and psychologists), and the bottom panel differences in contacts to psychiatric hospitals. Differences in the purchase of mental health medication were not affected (not shown). The right panel distinguishes results for boys (blue) and girls (red). Each panel corresponds to a separate two-way fixed effect estimation. Restricting the sample from three years pre- to five years post-event (corresponding with children aged 4-18) gives an estimation sample of 1,388 fathers with 900 sons and 931 daughters. Standard errors are clustered by father.

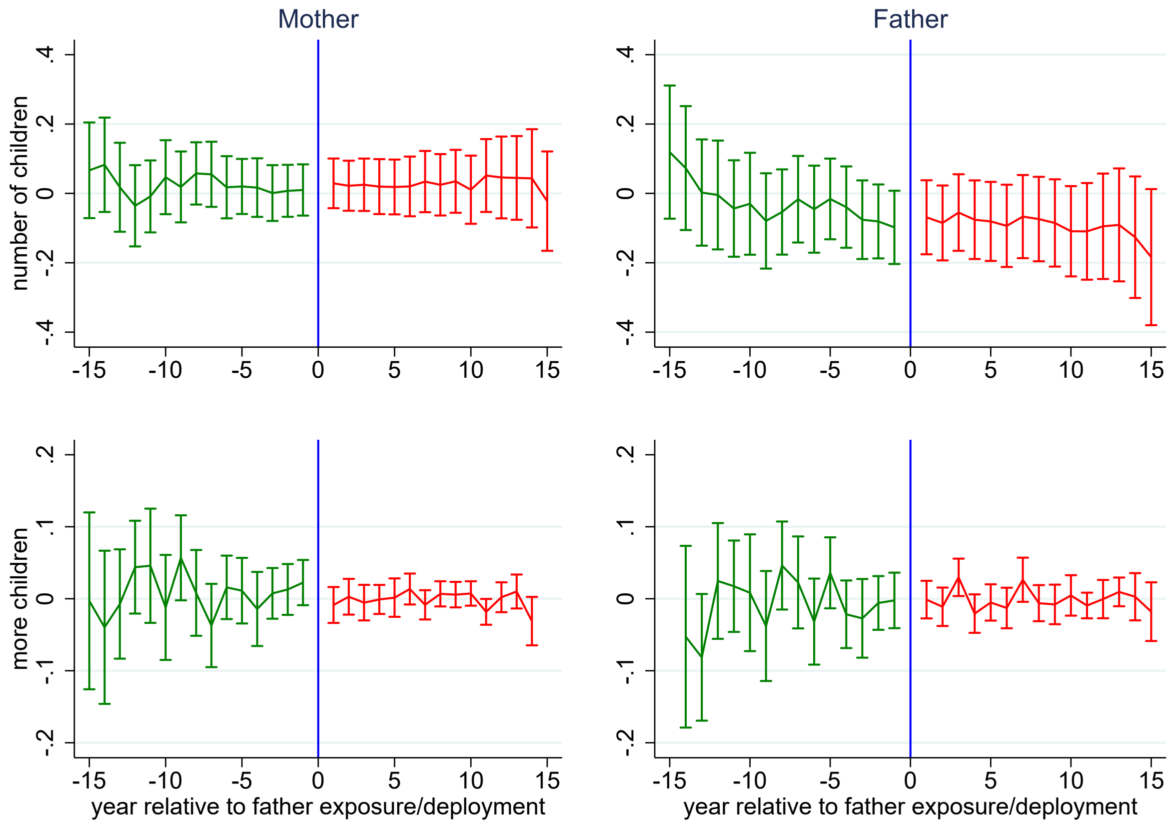

FIGURE A.3. Combat Exposure Effects on fertility

Notes: The figures show combat exposure indicator coefficients from OLS regressions explaining mother (father) outcomes in the left (right) panels, and number of children (indicator for child birth) in the upper (lower) panels. Other variables included in the regressions are the same as in column 1 of Table 7. The vertical line indicates year of father's combat exposure or first deployment if never exposed; the horizontal access shows years before and after–when the outcome is measured. Shaded bands indicate 95 percent confidence intervals.

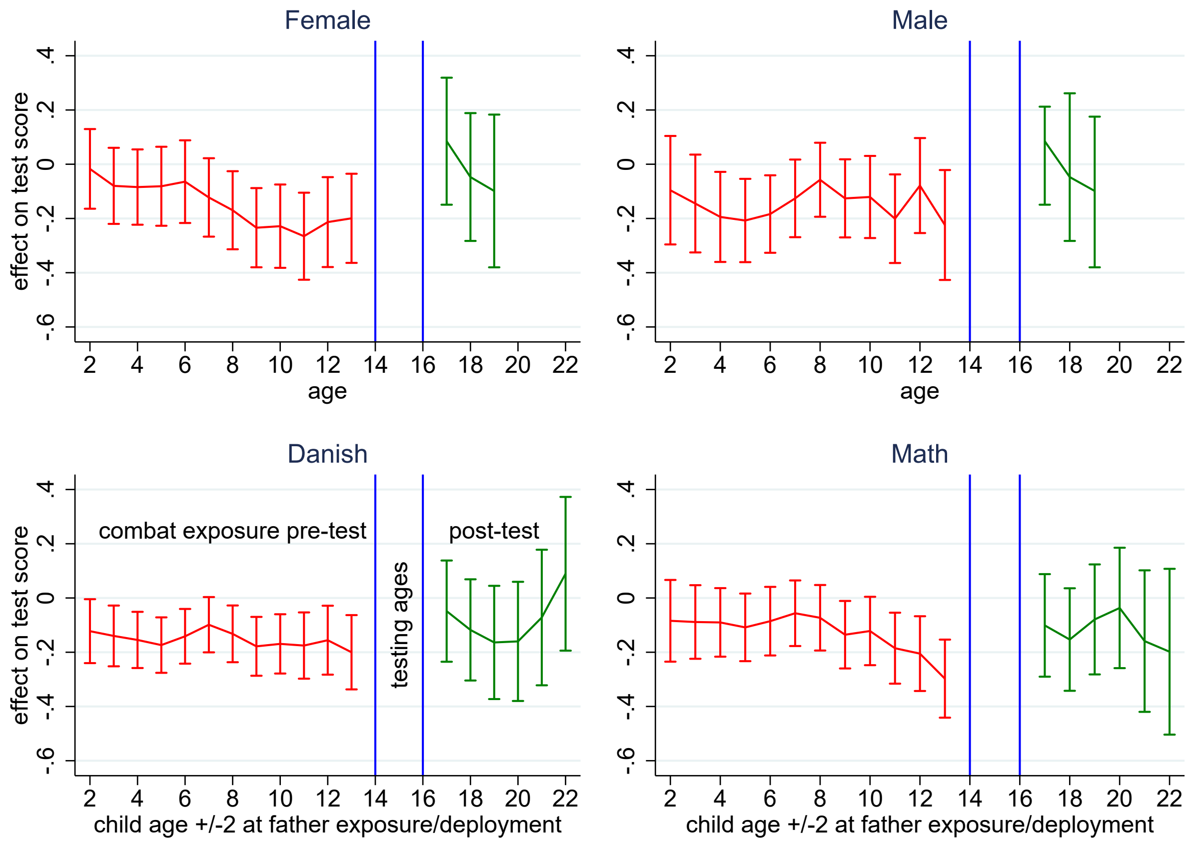

FIGURE A.4. Effects of Combat Exposure by Child Age at First Exposure, Sex of Child and Test Subject.

Notes: The figure shows coefficients of combat exposure indicators from OLS regressions explaining test scores using the same specification as in column 2 of Table 7. The upper panels split the sample by child's sex, and the lower panels by test subject. The lines show point estimates restricting to rolling three-year windows of the child's age at the father's first combat exposure or deployment. Shaded bands indicate 95 percent confidence intervals. The vertical line indicates typical 9th grade testing (age 15); left of the line indicates father's first exposure or deployment before the child test; right of the line indicates the father's first exposure or deployment after the child test.

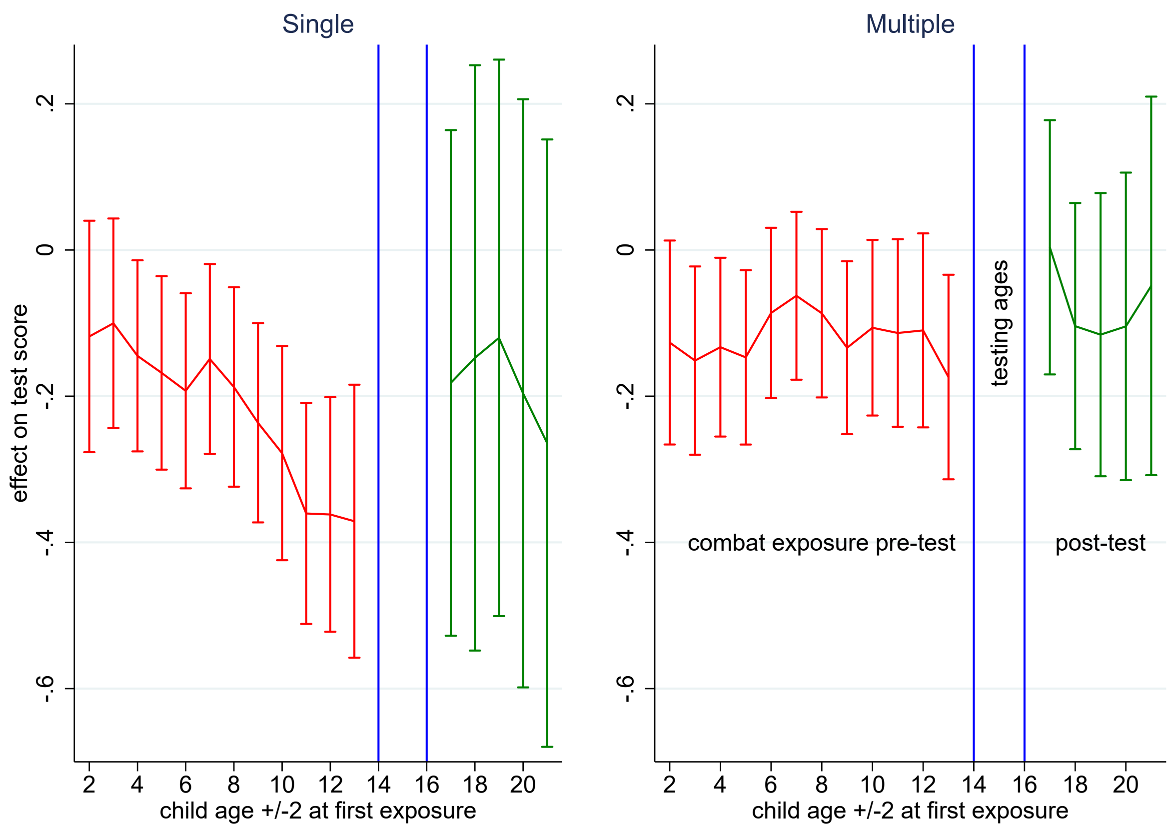

FIGURE A.5. Effects of Combat Exposure by Child Age at First Exposure and Number of Combat Events.

Notes: The figure shows coefficients on single and multiple combat exposure indicators from OLS regressions explaining test scores using the same specification and sample as in column 2 of Table 13. The left panel shows coefficients from a single combat event indicator variable taking the value 1 if the father was exposed to a single combat event, and 0 otherwise. The right panel shows coefficients from an indicator variable taking the value 1 if the father was exposed to more than one combat event, and 0 otherwise. The lines show point estimates restricting to rolling three-year windows of child's age at the father's first combat exposure or deployment. Shaded bands indicate 95 percent confidence intervals. The vertical line indicates the typical 9th grade testing (age 15); left of the line indicates the father's first exposure or deployment before the child is tested; right of the line indicates the father's first exposure or deployment after the child was tested.

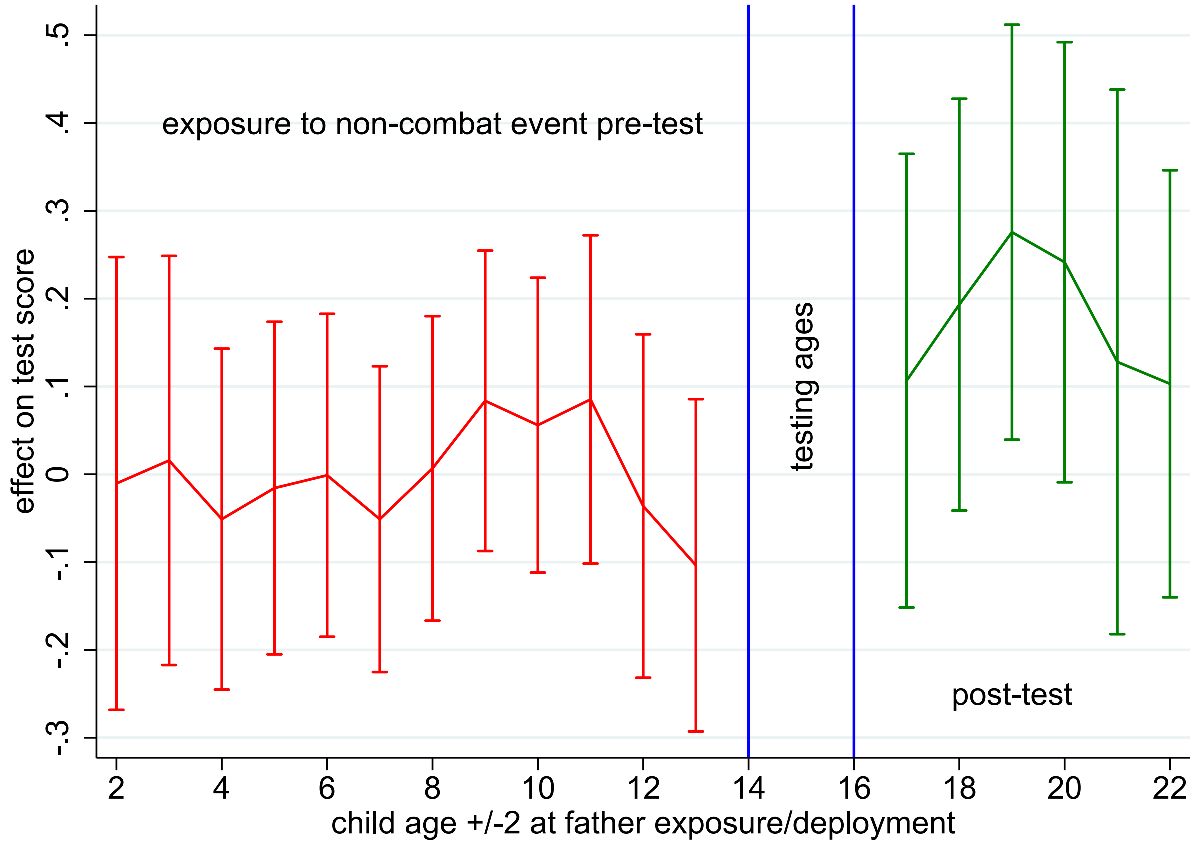

FIGURE A.6. Non-Combat Exposure Effects on Test Scores by Child Age at First Exposure

Notes: The figure presents coefficients on non-combat exposure indicators (conditional on his never being exposed to a combat event) from OLS regressions explaining test scores, using the same specification as in column 2 of Table 7. The line shows point estimates using the same sample as in column 2 of Table 7, restricting to rolling three-year windows of the child's age at the father's first non-combat exposure or deployment. The vertical line indicates the typical 9th grade testing age of 15; left of the line indicates the father's first non-combat exposure or deployment before the child is tested; right of the line indicates the father's first non-combat exposure or deployment after the child was tested.

B. Combat Exposure Data: Collection and Construction

We were granted research access to the two military archives of the Danish Defense (the old historical military archives and the new archive CAPTIA from August 2008) to collect special events from classified mission reports detailing individual soldier combat exposure. During their missions, officers must report these special events, i.e., all combat events, and other events related to their staff, e.g., sickness. The reports, sent to Danish Defense headquarters, use a standard format from which one can identify the date, place, type of event, and involvement of which persons or units. The reports also include battle damage assessment when relevant.

To retrieve this information from the two archive databases, we used the following keywords: "Special & ISAF/Iraq"; "Special & Afghanistan/Iraq"; "Special & dates of missions." Special events for mission ISAF 6 can be found in both archives because the mission straddled the archive system change in August 2008. As these special event reports can be exported to an Excel file, we could automatically retrieve information about the type of event, unit names, persons involved, and dates from those files. For each soldier wounded, killed, repatriated, or injured (non-battle injuries such as small accidents or sickness), the Ministry of Defense also provided information about their units and the event dates. We also had access to the full staff list for each unit for the 21 missions with the soldier's start and end date of deployments, the dates for leave (soldiers generally have a two-week leave during their deployment), repatriations or injuries, and re-assignment to a new unit during deployment. In our data, a soldier is affected by a special event (e.g., combat) if the event occurs during his mission and is related to the soldier or soldier-specific unit, while on duty. We observe 1,086 relevant special events involving combat for the 21 missions (see Figure B.1).

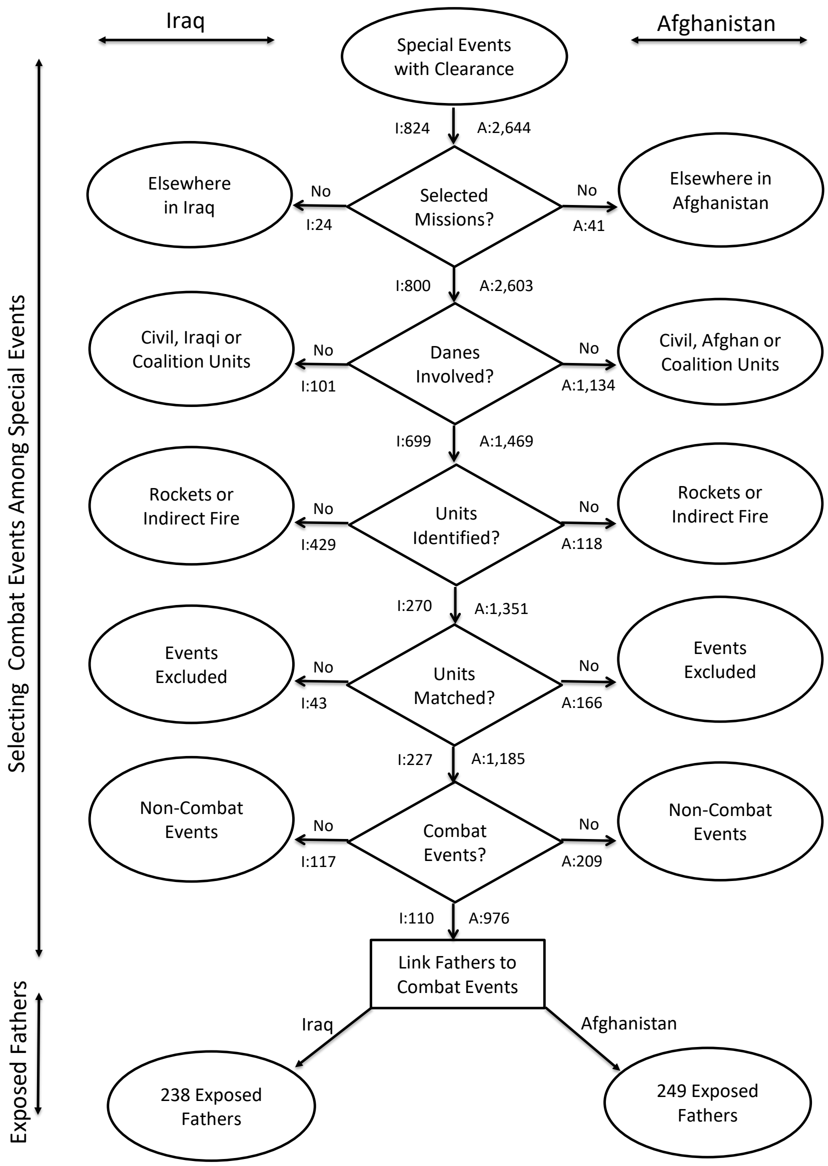

FIGURE B.1. Inclusion Criteria for Special Events

Notes: The sample includes all the special events with security clearance for the Danish area of responsibility (AOR). We have 2,644 and 824 special events for the missions in Afghanistan and Iraq, respectively. We focus on 21 missions, 12 in Afghanistan and 9 in Iraq. The flow chart shows our inclusion criteria for special events in these missions. These criteria include the selection of the mission of interest—the events related to Danish units in the Danish area of responsibility (AOR). Using mission fixed effect in our analyses, we disregard events that affected the entire staff (e.g., a rocket attack on the camp). We also exclude events we could not attribute to a unit or person—six percent of special events—with very few being combat-related. Numbers of excluded events for missions to Afghanistan (Iraq) are denoted A (I) next to the arrows.