CERGE
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Essays on Conflicts and Human Capital Accumulation

Dejan Kovač

Dissertation

Prague, March 2018

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Dissertation Committee

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To my family

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Abstract

In the first chapter of the dissertation, parental mortality is associated with a range of negative child outcomes. This paper studies the effect of paternal mortality on children's health and schooling outcomes using the universe of veterans' children born in Croatia, and all of the paternal deaths and injuries resulting from the 1991-1995 Croatian-Serbian war. Using linked administrative data, I find large negative effects of paternal death on high-school GPA, school absences, behaviour problems, and hospitalisations. I address potentially non-random selection into paternal death by using within-military unit differences in the extent of injury or death, essentially assuming that the members of a military unit all had similar probabilities of being killed or injured because they fought in the same battles. I am also able to shed light on an important mechanism underlying the estimated effects. Surviving spouses of those killed or injured were well compensated, so that the death of a father did not have a negative effect on household incomes. I find that a death or injury that occurred during the in-utero period has much larger effects than a death or injury in early childhood, suggesting that much of the negative effect is due to maternal stress.

In the second chapter, we answer the following research question. How important is intergenerational transmission of political values for sustaining ethnic divisions and nationalism? We implement a novel empirical strategy for identifying and studying a strong form of nationalism—the willingness to fight and die in a war for national independence—using name choices corresponding to previous war leaders. Based on data on almost half a million soldiers, we first show that having been given a first name that is synonymous with the leader(s) of the Croatian state during World War II predicts volunteering for service in the 1991-1995 Croatian war of independence and dying during the conflict. Next, we use the universe of Croatian birth certificates and the information about nationalism conveyed by first names to suggests that in ex-Yugoslav Croatia, nationalism was on a continuous rise starting in the 1970s, consistent with Fearon and Laitin (2003), and that its rise was curbed in areas where concentration camps were located during WWII. We also link the nationalist values we proxy using first name choices to right-wing voting behavior in 2015, 20 years after the war. Our evidence on intergenerational transmission of nationalism is consistent with the trade-off between within-family and society-wide transmission channels of cultural values proposed by Bisin and Verdier (2001) and it suggests a mechanism that sustains elevated parochial altruism across generations.

In the third chapter, we ask whether the long-term health costs of combat experience

are larger for soldiers exposed to higher risk of dying, i.e., to higher killed-in-action (KIA) rates of their units. We study the overall mortality effects and also focus on the suicide effects over a 20-year post-war period using data on all veterans of the 1991-1995 Croatian war for independence. The length of combat service predicts suicide risks, as does the exposure to psychological shocks such as the maximum experienced monthly unit-specific KIA rate. In the second part of the analysis we ask how war-related suicides affect the children of veterans and find significant negative effects on GPA, school absence and school behaviour. Comparing the children of soldiers who served within the same unit, we approximate the amount of psychological shock that each soldier experienced. Subsequently, we analyse the connection between selection into suicides and children's outcomes by comparing two groups of children: those whose fathers died from natural causes and those whose fathers committed suicide, in the post-war period. We find no differences in children's GPA across the two groups,. We find a significant difference in children's performance on high-stakes exams, where outcomes can determine future life trajectories. Remarkably, the children of veterans who committed suicide have lower scores on high school state exams than the children of veterans who died of natural causes. These findings are evidence how war costs are transmitted from one generation to another and how policymakers should internalise these unobserved costs into future policymaking.

Abstrakt

V prvni kapitole disertacni prace umrtnost rodičů je spojena s řadou negativních vlivů na dítě. Tento článek pojednává o vlivu otcovské úmrtnosti na zdraví dětí a jejich školní výsledky. Studované skupiny jsou děti veteránů narozených v Chorvatsku a všechna úmrtí a úrazy otců, které vyplynuly z chorvatsko-srbské války v letech 1991-1995. S využitím propojených administrativních dat jsem našel velký negativní vliv otcovy smrti na studijní průměr na střední škole, školní absence, problémy s chováním a hospitalizace. Problém potenciálně nenáhodné otcovské úmrtnosti řeším použitím rozdílů v rozsahu úrazů nebo smrti uvnitř vojenských jednotek. V podstatě předpokládám, že všichni členové jedné vojenské jednotky mají podobnou pravděpodobnost úmrtí nebo zranění, protože bojovali ve stejných bitvách. Také jsem schopen nastínit důležitý mechanismus, který je základem odhadovaných efektů. Přeživší manželky těch, kteří byli usmrceni nebo zraněni, byly dobře odškodněny, takže smrt otce neměla negativní vliv na příjmy domácností. Zjistil jsem, že úmrtí nebo zranění, ke kterým došlo během in utero (před narozením dítěte), mají mnohem větší účinky než úmrtí nebo zranění v raném dětství, což naznačuje, že většina negativních vlivů je důsledkem stresu matek.

Je mezigenerační předávání politických hodnot důležité pro dlouhodobé udržování etnických rozdílů a nacionalismu ve společnosti? V tomto článku implementujeme novou strategii pro identifikaci a studium silné formy nacionalismu--ochoty zemřít v boji za vlast ve válce o národní nezávislost. Využíváme půl milionu záznamů o vojácích zapojených na chorvatské straně do války mezi Chorvatskem a Srbskem z let 1991-1995. Naše strategie je založena na tom, že muži, jejichž křestní jméno koresponduje s jménem vůdce Chorvatska v průběhu druhé světové války, vykazují statisticky větší pravděpodobnost, že budou ve válce o nezávislost dobrovolníky, a že v ní zahynou v boji. Volbu křestního jména tak interpretujeme jako nepřesný, ale statisticky silný signál o hodnotách, které rodiče vkládají svým dětem. Dále používáme všechny rodné listy mužů narozených v Chorvatsku od roku 1930 ke sledování vývoje popularity nacionalistických jmen. Naše analýza implikuje nárůst nacionalismu v Chorvatsku od roku 1970 a omezení tohoto nárůstu v místech, kde byly za druhé světové války umístěny koncentrační tábory. Dále ukazujeme, že signál volby křestího jména koreluje s pravicovým volebním chováním v parlamentních volbách v roce 2015, dvacet let po válce.

Konečně ukazujeme, že mezigenerační předávání nacionalistických jmen je v souladu s predikcí modelu Bisin and Verdier (2001) citlivé na regionální rozdíly v úrovni nacionalismu.

V tomto článku se ptáme, zda zdravotní dopady válečných zážitků vojáků sledované po ukončení války jsou silnější pro ty vojáky, kteří byli vystaveni vyššímu riziku, že padnou v boji, tj. v těch jednotkách, kde v průběhu války zahynulo více vojáků. Sledujeme celkovou mortalitu a také riziko sebevražd u chorvatských veteránů války za nezávislost z let 1991-1995 v průběhu dvaceti let po ukončení války. Pravděpodobnost sebevražd závisí na celkové délce aktivní služby v průběhu války i na tom, zda byli veteráni v aspoň jednom měsíci služby vystaveni velmi vysokému riziku, že padnou v boji. V druhé části analýzy sledujeme, jaké dopady mají sebevraždy veteránů na školní prospěch a docházku jejich dětí. Porovnáváme děti, kterým zemřel otec z přirozených příčin s dětmi, kde otec spáchal sebevraždu a ukazujeme, že největší rozdíly jsou v úspěšnosti dětí v nejdůležitejších (stresujících) zkouškách typu maturitních zkoušek. Naše analýzy ukazuje na dodatečné náklady válečných zážitků.

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All errors are mine.

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Dejan Kovač

Introduction

Nationalism is an infantile disease. It is the measles of mankind.
Albert Einstein

The dissertation consists of three essays investigating how wars and civil conflicts affect children's long-run human capital accumulation through different set of mechanisms and how nationalistic values are made more salient during wartime. A growing body of research suggests that adverse conditions in early childhood may have particularly negative long term effects. For a young child, the loss of a parent is a traumatic event that can affect the child through multiple channels. The importance of a father's presence in child development has been studied in different contexts and all show that fathers have a significant effect on children's outcomes. The earliest contribution of fathers is already visible during infanthood; numerous research studies (Rowe et al. 2004; Yogman et al. 1995) show that a father's interaction with a child has a positive effect on cognitive development. The same effect continues during school age on quantitative and verbal skills (Goldstein, 1982), school performance (Astone and McLanahan; 1991), and values and attitude towards school (Alfaro et al. 2006). While the role of the father's involvement in child development has been extensively studied, less research has been devoted to studying the effects of the lack of a father's presence, because of methodological concerns and lack of quality data.

The first chapter estimates the causal effect of the loss of a father on children's outcomes by using several novel empirical approaches. I use data from a unique setting: the 1991-1995 Serbo-Croatian war, to compare the outcomes of children whose fathers served

in the same unit and thus were exposed to a similar risk of death. This strategy captures unobserved elements of the endogenous part of war exposure that are correlated both with the probability of dying and children's long-run outcomes. Further, I use a quasi random variation in which the state of being killed or seriously injured is exogenous to an individual. In the second part of the paper, I focus on the prenatal and postnatal consequences of a father's death on children's outcomes, and disentangle the effect of each channel of effect.

The second chapter studies the changes in social values during wartime. Nationalism has been a principle driver of wars and of political violence throughout modern history, particularly in the Balkans (Petersen, 2002; Biondich, 2011). Wars, in turn, have dramatic, long-lasting effects on a country's political, cultural, and ethnic identity, according to a recent body of work based in large part on voting behavior (Mayhew, 2004; Bellows and Miguel, 2009; Anderlini et al., 2010; Petersen, 2012; Fontana et al., 2016, Ochsner and Roesel, 2016). Experiencing war also strengthens in-group cooperation and altruism towards members of one's group (Choi and Bowles, 2007; Voors, et al., 2012; Bauer et al., 2016), i.e., preferences supportive of nationalism. A key unanswered question in the literature is to what extent the persistence of the effects that wars have on political values and in-group cooperative behavior is underpinned by intergenerational transmission of values within families.

In this paper we implement a novel empirical strategy for identifying and studying nationalism and its intergenerational transmission based on child name choices corresponding to war leaders(Throughout the paper, we could have alternatively used the term patriotism for the values we study). Such indirect approach is particularly applicable in countries that feature a sharply divided ethnic mix and in settings where leaders' names are notoriously associated with their political beliefs. Given the widespread availability of birth certificate records, the approach naturally lends itself to the study of intergenerational transmission and is available in many historical settings. Importantly, our approach allows us to measure a strong form of nationalism—the willingness to fight and die in a war for national independence—that is in principle difficult to elicit in surveys. This trait is of substantive interest to nations dealing with free-riding in active war service.

The third chapter is concerned with the intergenerational transmission of war related costs. Wars have long-term costs that reach far beyond their ceasefire date. The physical and mental health consequences of war experiences for soldiers are a critical component of

the overall evaluation of war costs. They are also important for the design of public health systems in which the prime goal is the long-term health of veterans (e.g., Boscarino, 2006). The literature on veterans of major armed conflicts highlights the relevance of combat experience for post-war health outcomes. For example, Cesur et al. (2013) suggest that deployment to combat zones, and exposure to enemy fire and to death, raise the risk of suicide ideation in the post-war period. A key feature of combat experience is that of a military unit, possibly of a small group of co-soldiers with whom one often forms strong social bonds under fire. Our research allows us to track soldiers who served in the same unit during different periods and estimate the magnitude of their social bonds as well as the magnitude of war carnage each person experienced.

In the second part of the paper, we ask whether and how these psychological costs of war transfer to the next generation via families of veterans. We find that the largest effect is on veterans' children. The children of veterans who committed suicide after the war have worse GPA, school behaviour, national exam results and are more often absent from school than the children of veterans who served in the same unit, but who did not commit suicide. By comparing the children of soldiers who served within the same unit, we confine our analysis to veterans who experienced approximately the same amount of psychological shocks. This empirical strategy allows us to estimate how war-related psychological shocks diffuse through time and what the exact human capital costs are for the next generation.

Chapter 1

Do Fathers Matter?: Paternal Mortality and Children's Long-Run Outcomes

Dejan Kovač[1]

Abstract

Parental mortality is associated with a range of negative child outcomes. This paper studies the effect of paternal mortality on children's health and schooling outcomes using the universe of veterans' children born in Croatia, and all of the paternal deaths and injuries resulting from the 1991-1995 Croatian-Serbian war. Using linked administrative data, I find large negative effects of paternal death on high-school GPA, school absences, behaviour problems, and hospitalisations. I address potentially non-random selection into paternal death by using within-military unit differences in the extent of injury or death, essentially assuming that the members of a military unit all had similar probabilities of being killed or injured because they fought in the same battles. I am also able to shed light on an important mechanism underlying the estimated effects. Surviving spouses of those killed or injured were well compensated, so that the death of a father did not have a negative effect on household incomes. I find that a death or injury that occurred during the in-utero period has much larger effects than a death or injury in early childhood, suggesting that much of the negative effect is due to maternal stress.

[1]I would like to thank my mother Anica Kovac (1953-2012) for all the love and continuous support she gave me to pursue my dreams. For valuable comments and significant contributions I would like to thank Orley Ashenfelter, Janet Currie, Henry Farber, Randy Filer, Stepan Jurajda, Jan Kmenta, Alexandre Mas, Christopher Neilson and Jacob Shapiro. Additionally, I would like to thank the participants in the IRS Labour Lunch session at Princeton University, and participants and my committee at the Dissertation Proposal Workshop, CERGE-EI, Prague.

1.1 Introduction

The importance of a father's presence in child development has been studied in different contexts and all show that fathers have a significant effect on children's outcomes. The earliest contribution of fathers is already visible during infanthood; numerous research studies (Rowe et al. 2004; Yogman et al. 1995) show that a father's interaction with a child has a positive effect on cognitive development. The same effect continues during school age on quantitative and verbal skills (Goldstein, 1982), school performance (Astone and McLanahan; 1991), and values and attitude towards school (Alfaro et al. 2006). While the role of the father's involvement in child development has been extensively studied, less research has been devoted to studying the effects of the lack of a father's presence, because of methodological concerns and lack of quality data.

Worldwide, an estimated 101 million children alive in 2015 had lost their father[2]. This number has been on the rise due to ongoing wars, conflicts, diseases and poverty. Many more children are deprived of a father's presence through divorce[3], incarceration[4], and even employment. Loss of a father can potentially affect a child's outcomes through several mechanisms. First, because they have one provider fewer, households without a father are often poorer, according to Haveman and Wolfe (1995). Second, fathers may contribute to child development directly through their interactions with their children by transmission of skills and traits (Kalil et al. 2015). Third, the experience of losing a parent may have harmful psychological effects. The Holmes and Rahe Stress Scale[5] measures stress by using a number of "life change units", and ranks death of a parent for non-adults as the number one stressor. Clearly, all three channels of paternal mortality can severely affect a child's human capital accumulation, so understanding the mechanisms of effect is necessary to create optimal responsive policies.

One of the main problems in tackling this research question is the difficulty of finding the right methodological tool or identification strategy that would provide causal estimates of loss of a father on children's outcomes. There have been attempts to estimate the effects of the lack of a father from households through divorce or incarceration (Amato et al.1991; Murray and Farrington; 2008, Harper and McLanahan; 2004), but these

[2]U.S. Government "5th Annual Report to Congress on Public Law 109-95" and affirmed by UNICEF.

[3]In EU-28 states, the crude divorce rate increased from 0.8 per 1 000 persons in 1965 to 2.0 in 2011 (http://ec.europa.eu/eurostat/statistics-explained/index.php/Marriage_and_divorce_statistics).

[4]According to the Bureau of Justice Statistics, National Prisoner Statistics Program, from 2003 to 2013, the number of males in US federal and state correctional authorities has risen for around 100 000.

[5]The Holmes and Rahe Stress Scale is based on Holmes and Rahe (1967)

estimates do not provide a causal effect since family-level unobservables are plausibly correlated with the selection into divorce or incarceration and child outcomes. Also, in these types of research studies there are always problems accurately measuring the absence of a father from a household (McLanahan et al. 2013). Newer research studies provide a step forward in estimating the causal effect by using the death of a parent as a better measure for complete absence of a parent from a household (Gertler et al. 2004), but still do not resolve the self selection into death. Nevertheless, causal inference is possible in some settings. For instance, Kalil et al (2015) used a within family variation in father exposure that occurs across siblings in the event of the father's death to estimate the effect of the father's presence on intergenerational transmission of educational attainment.

This study estimates the causal effect of the loss of a father on children's outcomes by using several novel empirical approaches. I use data from a unique setting: the 1991-1995 Serbo-Croatian war, to compare the outcomes of children whose fathers served in the same unit and thus were exposed to a similar risk of death. This strategy captures unobserved elements of the endogenous part of war exposure that are correlated both with the probability of dying and children's long-run outcomes. Further, I use a quasi random variation in which the state of being killed or seriously injured is exogenous to an individual. In the second part of the paper, I focus on the prenatal and postnatal consequences of a father's death on children's outcomes, and disentangle the effect of each channel of effect. Moreover, since Croatian widows were generously compensated with a full pension, as were families with disabled veterans, the income channel does not operate in standard way. While we may not say that the income channel is not entirely operative in this setting, we might say that it does not provide a negative income shock to a fatherless family as it does in the literature. In fact, unusually, there is no difference in average income between families that lost a father and families with fathers[6]. Yet, as we will see, paternal loss is still associated with significant negative effects on children's educational outcomes and risky health behaviour. Thus, in the remainder of this study, I focus on exposure to the father and the psychological shock of paternal death to both children and their mothers as mechanisms that may explain these lingering effects.

The second part of my analysis of in-utero shocks is closely related to recent work by Black, Devereux and Salvanes (2016) and Persson and Rosin-Slater (2016). Both studies used the deaths of grandparents and relatives, respectively, during the in-utero period,

[6]Section 5.1. provides an in depth discussion about the income channel and Figures 8 and 9 provide evidence that widows were overcompensated.

to study the psychological shock to mothers. Black, Devereux and Salvanes (2016) used sibling fixed effects: comparing the outcomes of two children with the same mother but where a parent of the mother died during one of the pregnancies. Persson and Rosin-Slater (2016) do not use sibling fixed effects because, in their case, presence of younger siblings is endogenous due to maternal fertility responses. In this study I use military unit fixed effects and the endogeneity of maternal fertility response does not pose a problem. To disentangle the effect of exposure to a father from psychological effects, another novel empirical strategy is used: quasi-random variation in timing of injury and death. The rich dataset allows comparison of child outcomes conditional on their age when a father's death or injury occurred. Since the state of being seriously injured or killed is exogenous to a soldier, this empirical strategy provides consistent estimates of a father's death on children's outcomes. Furthermore, during the in-utero period, only channel through which a child can be affected by its father's death is solely through the mother's psychological shock[7]. By focusing only on two periods for a child: in-utero and the first year when the father's death/injury occurred, I differentiate the father's time investment from psychological shock. During the in-utero period, the father's exposure or time investment is zero, and during the first year it is minimal and close to zero. Across both periods, children who lost their fathers are both deprived of father's presence, while the in-utero group is solely exposed to the direct psychological shock of the mother, making it the only contributing factor to this analysis[8].

This paper makes several contributions to the existing literature. First, I used a new methodological approach with military unit fixed effects and comparison of outcomes of children whose fathers were seriously injured or killed to estimate the causal effect of a father's death on children's long-run outcomes. I find that loss of a father has a strong and negative effect on all considered children's outcomes. Children who lost a father have, on average per school year, a 0.129 lower high school GPA, are 13.862 hours more absent from school and exhibit worse school behaviour by 0.077 than children with a father. Also, fatherless children are 1.36 times more likely to sustain an injury requiring a hospitalisation[9] than non-orphans. The second contribution of this paper is in testing

[7]Death of a spouse is ranked as number one stress on Holmes and Rahe Stress Scale.

[8]Same as the rest of the literature Black et al.(2016) and Kalil et al.(2015) I am not able to distinguish the mechanisms of the psychological shock itself i.e. what part of the effect we contribute to stress hormones of mothers being infused in utero and what part are changes in mother's behaviour due to psychological shock. For instance, after husband's death what part of mothers starts smoking or drinking.

[9]We cannot contribute this to selection into hospitalisation by demographics because health services in Croatia are free and accessible to everyone.

the importance of a child's age when the father's death occurs. I find that the prevalent effect is during the in-utero period, where I find a 30 to 50% higher magnitude of impact for schooling outcomes and more than double the probability of an injury for fatherless children who experienced the loss of the father during their time in the womb. Further, prenatal exposure to paternal mortality shock affects girls more than boys for GPA, behaviour and injuries[10]. Focusing only on the narrow timing of father's death: in-utero and up to child's first birthday, it is possible to disentangle the psychological effect from exposure to the father. Lastly, combining all possible permutations of sibling pairs within a family, I am able to estimate a differential exposure to father's time investment across different pairs of siblings beyond the narrow in-utero - first year period. I find that as the level of father's disability decreases, additional year of father's time investment becomes significant for a child's development. This approach opens a new venue to differentiate and estimate the importance of a father's presence from other channels of effects.

Overall, the unique dataset allows me to track children from in-utero up to the high school period through schooling and hospitalisation outcomes. The study provides strong evidence that testifies to the importance of the prenatal period. To the best of my knowledge this is the first research study that is able to differentiate channels of effect caused by a paternal mortality shock.

1.2 Literature Review

A growing body of research suggests that adverse conditions in early childhood may have particularly negative long term effects. For a young child, the loss of a parent is a traumatic event that can affect the child through multiple channels. The three main channels of effect that have been studied in the literature are decreased financial investment in the child, lack of parental exposure and psychological shock from the death of the father.

The effects of family income on child development have long been an important topic in the field, especially for policymakers. A number of studies report a positive correlation of child outcomes with family resources, such as income, education, assets and time. Research consistently documents that poverty has many detrimental effects on child development outcomes, putting them at greater risk of poor nutrition and health problems (Klerman, 1991), lower educational attainment (Hill and Duncan, 1987; Haveman and

[10]Boys show larger effect only for high school absence.

Wolfe, 1995), lower school grades and greater likelihood of dropping out of school (Levin, 1986). Morris et al. (2003) argue that family income is more important at younger ages, though persistent poverty is worst of all. In a recent study, Fletcher and Wolfe (2016) find an important divergence in non-cognitive skills based on family income that accumulates over time. Furthermore, according to Amato and Booth (2003), the effects of income on child development outcomes are mostly due to the father's income, since fathers continue to contribute on average more than two thirds of the family income. Although the world-wide gender wage gap has fallen significantly over the past 50 years men still hold the majority of income[11] which contributes to importance of this research, since the decrease in financial investment from a father's death is still high.

Another type of investment that is important for child development is the time investment by a father or exposure to the father. This involves transmission of any type of skills or traits through time spent with a father. The uniqueness of this study is in the possibility of estimating the effect of these two types of investments separately. By using the variation in children's age at the father's death I estimate the significance of paternal exposure on children's schooling and health outcomes. The importance of parental exposure to children has already been addressed by several authors, but in slightly different contexts: (Danzer and Lavy, 2013; Heckman, Pinto and Savelyev; 2013; Gertler et al. 2013) established a positive causal effect between parental care in childhood and adult outcomes. The main results from their studies are that more exposure to parental care results in better adult outcomes, while (Danzer and Lavy; 2013) condition their results on parents' education level, which suggest that quality of exposure also matters. The most dominant measures of the quality of a father's exposure include the use of time diaries, correlational studies that demonstrate the salience of a father's presence. From a methodological point of view, there are limitations in how measurements are made when assessing the relationship between father involvement and child outcomes[12] in these types of studies, so I used only the length of time of exposure to a father to estimate the effect. In a similar manner, Kalil et al (2015) exploited the systematic differences in paternal exposure that arise across older and younger siblings when their father dies, and found that the presence of a father substantially increases intergenerational transmission of educational attainment.

[11] Weichselbaumer and Winter-Ebmer (2005): From the 1960s to the 1990s, raw wage differentials worldwide have fallen substantially from around 65 to only 30%.

[12] Measurement issues (Pleck and Masciadrelli, 2004); sampling issues and representativeness Harper and McLanahan (2004); social class issues Kesner and McKenry (2001)

The last channel of effect is the short-term and long-term psychological costs of loss of a parent. According to Trembley and Israel, (1998) the untimely death of a parent represents a profound crisis in both acute and long-term adaptation for surviving family members, deprives children of an enormously significant emotional exchange, and may leave the remaining parent unprepared to fulfil his or her parental role. For instance, Harris et al. (1986) observed that it was much more likely for a mother to take the additional breadwinner role of a lost father during the post World War II period than for a father to combine adequate care-taking with his traditional provider function. Furthermore, from a child's perspective, as Gertler, Levine and Ames (2004) explain, trauma may make it difficult for children to focus on their studies temporarily or permanently. Possible permanent consequences are visible in the form of depression when affected children reach adulthood, as in Nelson (1982). The novelty of this study is in using the psychological shock from father's death on mothers during pregnancy to separate the psychological effect from other effects. As stated in Persson and Rosin-Slater (2016), during the in utero period, the only channel through which a child can be affected is the psychological shock of the mother, while after birth a child is exposed to all postnatal consequences of father's death. Black, Devereux and Salvanes (2016) use a similar empirical strategy with mother fixed effects and compare the outcomes of siblings where the mother experienced death the of a parent during one of the pregnancies. Unlike these studies, I use military unit fixed effects and compare children of fathers who served in the same unit, and thus who had similar exposure to war, where one father died and the other was seriously injured during military service. This strategy is a step forward in using cross-sectional variation of the probability being killed or injured to estimate the causal effect of the father's death on children's outcomes. Unlike Black, Devereux and Salvanes (2016), who used the variation in timing of a grandparent's death and compared outcomes of children of the same mother I compare outcomes of the children of killed, seriously injured and uninjured soldiers. Although losing the father during peace time is not the same as losing the father during wartime, this context does not diminish the added value of this research. On the contrary, it allows me to use new identification strategies to estimate the causal effect of loss of a father that prior research could not.

1.3 The Model

The theoretical framework is laid out in the first section and followed by an econometric specification of the model and differentiation between model specification of panel and cross-sectional data. The last section is a theoretical discussion of possible interpretations of the empirical results.

1.3.1 Theoretical framework

The importance of investment in early childhood on adult outcomes is based on several theoretical models. Grossman(1972) models health as a stock variable that varies over time and has its own investment and depreciation. Although, in his model it is referred to as a health stock, henceforth I will refer to it as a human capital stock, since this variable can be multidimensional, and a health stock is just one dimension. Human capital h at the completion of childhood, depends on A, factor productivity term, investment in human capital through the age of 5 and after the age of 5[13], which is denoted as I_1 and I_2 respectively, and weight for each period γ. Depending on the levels of I_1 and I_2 in combination with γ linearity makes this model easy to interpret. Equation (1) was additionally augmented to a two period model by Zweifel, Breyer, and Kifmann (2009), but this did not resolve perfect substitutability between the two investments, which makes it a strong assumption for a model.

$$h = A(\gamma I_1 + (1-\gamma)I_2), (1)$$

Heckman (2007) introduced a constant elasticity of substitution (CES) function as a new approach to human capital investment technology. Now, the allocation of investment between periods I_1 and I_2 will affect h differently depending on the elasticity of the substitution, 1/(1- ϕ) and the weight γ:

$$h = A[\gamma I_1^{\phi} + (1-\gamma)I_2^{\phi}]^{1/\phi}, (2)$$

There are two important features that are not captured by (2). First, there might be dynamic complementarities which say that investments in period t are more productive

[13]As in equation (1) I_1 and I_2 can be used to denote years rather than periods. In this study, I_1 and I_2 will also represent prenatal and postnatal periods to test the timing of the shock in a more in depth manner.

when there is a higher capability in t-1. Second, the existence of 'self-productivity', in which higher levels of human capital stock in one period create higher levels in future periods. Unlike Grossman (1972), this would matter more in cases when h is multidimensional and when the cross correlations of different dimensions are positive; for instance better health implies better cognitive abilities. The multidimensional case is of special importance for this paper, since I track several dimensions of a child's human capital accumulation.

Next, I incorporate an exogenous shock that occurs during the first childhood period. As in Currie and Almond (2011), exogenous shock μ_g is independent of I_1 and net investment in the first period is:

$$\bar{I}_1 + \mu_g{}^{14}$$

It is possible to extract μ_g while holding other inputs fixed, i.e. it is implicitly assumed that there is no investment response to this shock in either period. This way it is possible to explicitly derive the impact of an early life shock on adult outcomes:

$$\frac{\delta h}{\delta \mu_g} = \gamma A[\gamma(\bar{I}_1 + \mu_g)^{\phi} + (1-\gamma)I_2^{\phi}]^{(1-\phi)/\phi}(\bar{I}_1 + \mu_g)^{\phi-1}, (3)$$

As stated in Currie and Almond (2011), most analyses of 'early origins' focus on estimating the reduced form effect, $\frac{\delta h}{\delta \mu_g}$. Whether this effect represents a pure effect of a shock or also represents the effect of responsive investment is an open economic question. With their post shock investment, parents can either reinforce or compensate for the effect. In the case of paternal mortality shock, children lose both financial and time investment from their father, so all of the investments made come from the mother, raising her opportunity cost. The uniqueness of this research is that the financial investment from the father was compensated through child policies [15], but not the lack of time investment, making this the only negative channel of effect. In terms of the compensating effect, even if it was present from the mother in period $\bar{I}_2$ yields the conclusion that any estimate will in fact underestimate the pure effect of a paternal shock.

[14] Theoretically μ_g can be either positive or negative depending on the type of shock, while it is assumed that

$$\bar{I}_1 + \mu_g > 0$$

[15] The financial channel and its role is discussed in detail in chapter 5.1

1.3.2 Econometric specifications

The main goal of the paper is to estimate the effect of paternal mortality on children's long-run schooling outcomes, while overcoming the potential problem of non-random death of the father. In order to accomplish this, several novel approaches are used to estimate the effects. First, the unique data allows estimation of military unit fixed effects. This strategy captures unobserved elements of the endogenous part of the exposure to war which can be correlated both with the probability of dying and long-run outcomes of a child[16]. Second, once controlled for the uneven war exposure across military units, the comparison is made on children of uninjured, injured and killed soldiers within the same unit. Third, the state of being seriously disabled or dead is considered to be exogenous[17] to an individual within the same unit, so it is a plausible assumption of the model to compare the outcomes of children' between these two groups. Fourth, the study exploits variation in the exact timing of a father's death or injury to estimate the effects of different types of psychological shocks during prenatal and postnatal periods on children's long-run outcomes.

The main research question will be answered through two different datasets: panel school data and cross-sectional hospitalisation data. The robust specification that will be used throughout the paper is in equation (1) and will be used for panel data model, while for cross-sectional data a Poisson regression model is used.

FE Model:

$$\text{School Out}_{iust} = \alpha_0 + \beta_1 FD_i + \beta X_{it} + \lambda_u + \zeta_s + \gamma_t + \eta_{iust} \quad (1)$$

School Out_{iust} is the school outcome for child i, in school s, in year t, and father's unit u; FD_i is a dummy variable =1 if child i lost his/her father in a war and 0 otherwise [18]; X_{it} is set of controls for child i in time t; λ_u is unit FE; ζ_s is school FE; γ_t is time FE; η_{iust} is the error component. School outcomes used in this regression analysis are: GPA per year, total school absence measured in school hours and school behaviour[19]. The set

[16]For example, parent's risk aversion

[17]Even for soldiers within a same unit that are exposed to same battles, there might be selection into more risky operations within a unit. Focusing on that particular group of soldiers, still if a grenade lands next to them, it is random who will die and who will be heavily disabled.

[18]The baseline group varies within the analysis. In the first part the baseline group are injured and uninjured combined. In the second part the baseline group are only uninjured, while in part the baseline group are uninjured fathers with dummies for every level of disability.

[19]The Croatian education system has the following grading scale for school grades:2 (satisfactory), 3 (good), 4 (very good) and 5(excellent); while for school behaviour there are: 1(bad), 2(good) and

of controls used in this research are bounded by data limitations and are standard in the literature[20].

Poisson model:

$$\text{Injury}_{it} = \alpha_0 + \beta_1 FD_i + \beta X_{it} + \eta_{it} \quad (2)$$

Injury_{it} is a hospitalisation due to an injury for child i, in time t; FD_i is a dummy variable=1 if child i lost his/her father in a war and 0 otherwise; X_{it} is set of controls for a child i in time t; η_{iust} is the error component.

Dyadic model:

$$\Delta\text{School Out}_{ijf} = \alpha_0 + \beta_1 \Delta\text{Time exposure}_{ijf} + \eta_{ijf} \quad (3)$$

$\Delta\text{School Out}_{ijf}$ is the difference in school outcomes for sibling pair ij, in family f, where Δ is the difference in outcomes between older minus younger sibling; $\Delta\text{Time exposure}_{ijf}$ is the difference in time spent with a father for a pair of sibling ij, in family f; η_{ijf} is the error component. This regression is run by deceases status and all disability levels of fathers.

For the dyadic model I created all possible permutations of siblings within each family to disentangle the differential sibling exposure to father's time investment.

1.3.3 Prenatal and postnatal analysis

This part of the empirical strategy improves on Persson and Rosin-Slatter (2016), in which they compared children who experienced the death of a family relative during the prenatal period, with those who experienced the death in the postnatal period. Using the quasi-random variation of being killed or being seriously injured within the same unit it is possible to test the effects of different psychological shocks[21] on children during prenatal and postnatal periods. Children who were exposed to a psychological shock from their

3(exemplary).

[20]Controls used are standard in the literature: see Currie and Almond (2011), Black et al. (2016), Kalil et al, (2015), Persson and Rossin-Slater, (2016).

[21]According to the Holmes and Rahe stress test, the death of a spouse is ranked the number 1 life stressor, while health issues of a close family member is ranked 11th, so the baseline group has some psychological shock but of a much lower magnitude. It only matters that the difference in magnitudes is estimated consistently.

mother during the prenatal period can only be affected through the uterine environment, while the rest of children have been exposed to all postnatal consequences of the father's death. The regression used in the estimation is the same as the first two specifications, but confined only to children of killed and injured soldiers.

The father's death can influence a child through three channels of effect: financial investment[22], time investment and psychological shock. By using a particular identification strategy it is possible to disentangle the effects. Using the random variation in the timing of death and injury of a father, I compare children of killed with those of seriously disabled soldiers while controlling for war exposure within the same unit. For the population as a whole this will give a joint estimate of the time investment of a father and a psychological shock. Focusing on children who experienced the paternal mortality shock during in-utero and first year period I am able to separate the two. The time investment of a father with a child during prenatal period is zero and for the first year is also minuscule, but non-zero. Next, during the in-utero period a child receives a direct effect from a psychological shock through the uterine environment and high cortisol levels of the mother[23] making it the only channel of effect in this comparison.

The theoretical model presented in Section 3.1. implicitly assumes no investment responses by mothers to paternal mortality shock in either period, which is a strong assumption. The responsive investment of mothers is unobserved in the data, so it is not possible to check the magnitude of investment or whether it is responsive or compensatory. My theoretical addition will build up on pioneering work of Currie and Almond (2011) in order to utilise the empirical strategy in this type of a setting. I will relax the assumption of no responsive investment and elaborate on potential mechanisms. I will consider several cases as a theoretical application of Currie and Almond (2011) model to my particular setting where the 'no compensating investments' assumption is relaxed.

Case 1

Responsive investment of mothers after paternal mortality shock is non-zero.

If the responsive investment of mothers is non-zero then the reduced form estimate of the effect $\frac{\delta h}{\delta \mu_g}$ is a joint estimate of a shock and responsive investment. After the loss of the father, mothers can either maintain the same level of investment as before or invest

[22]The uniqueness of this research shows that this channel remained intact due to military pension payments.

[23]Loss of a close family members induces greater levels of self-reported grief and produces stronger cortisol responses (see, e.g.: Segal and Bouchard, 1993; O'Connor et al., 2012).

more to try to compensate. In the first case, since investment is the same we would get the pure estimate of paternal mortality shock. In the second case, since mothers invest more, the pure effect of the paternal mortality shock is much larger i.e. true effect of my estimates is underestimated.

Case 2

Mothers are not gender discriminatory in terms of compensating investment

Several studies suggest that both shocks and interventions can have different long-term effects on males and females. One possibility is that gender effect differences are biological[24]. For example, boys may be less robust than girls, so that the same health shock can affect boys and girls differently (e.g., see Kraemer (2000), Almond and Mazumder (2008)). Alternatively, gender differences may reflect differential parental or societal responses to shocks inspired by son preferences or by beliefs about biological gender differences. Either way, as in previous studies, I am not able to distinguish whether the gender differences in reaction to shocks arise from different biological factors or different post shock differential treatment by the child's environment. Nevertheless, I can elaborate on possibilities that might be driving the results. If mothers are not gender discriminatory in terms of post shock investment the results shown in this paper about gender differences give evidence of biological differences in reaction to a paternal mortality shock. Otherwise, the differences lie in different interventions with respect to gender.

Case 3

Mothers are not discriminatory in terms of timing of the shock

In the last decade, economists have produced a great deal of research in support of the "in-utero" hypothesis. For instance, Currie and Cole (1993) compare siblings in families in which the mother received welfare while one child was in utero, but not while the other child was in utero, and find no difference in the birth weight of the siblings. In this paper, I use the timing of the death of the father to estimate the effect of psychological shock during the in-utero period. Comparing children who lost their father while in utero with

[24]Wizemann and Pardue (2001) find that basic genetic and physiological differences, in combination with environmental factors, result in behavioural and cognitive differences between males and females. They find that hormones play a role in behavioural and cognitive sex differences but are not solely responsible for those differences. Akbulut and Yuksel (2017) find that girls suffer the most from war exposure.

those who were up to their one year of age at the time of the loss, it is possible to isolate the mechanisms. Looking at that narrow time window, the assumption is that mothers do not discriminate in terms of responsive investment conditional on timing of the paternal mortality shock. For example, if mothers that experienced a paternal mortality shock during the child's first year compensate more with investments, the difference would not be because of the differential impact of the psychological shock from the father's death but rather the difference in investment. As in past research, using the random timing of death and injury of a father remedies any potential unobserved elements.

1.4 Data

The first section provides information about the historical setting of the study. The second sections describes datasets and variables used in this research.

1.4.1 Historical setting

Serbo - Croatian war (1991-1996)

The Croatian War for Independence, also known as Serbo-Croatian war, was fought from 1991 to 1995 on the whole territory of Croatia (Figure 3). During the war, approximately 20 000 civilians and soldiers were killed, and estimates indicate around 50 000 were injured. Due to the lack of a civilian casualty registry, this study will focus only on combatants i.e. military personnel. This sub-selection can raise certain questions about the generalisability of this study, but a series of robustness checks are made, including a comparison of the children of volunteers and draftees, to try to make the inference more generalisable[25].

1.4.2 Datasets

The data used in this research is combined administrative data from several official government sources in Croatia: the Ministry of Veterans, the Ministry of Health, the Department of Defence, the Statistical Office and the Ministry of Science, Sports and Education.

[25]As Angrist and Krueger (1992), I use set of draftees as representative sample of the Croatian population as a whole. Whether the draft was really random it is beyond the scope of this paper, but a more detailed analysis of the draft procedure appears in Jurajda and Kovac(2016).

Military data

Military data used in this research includes the universe of Croatian military veterans from the Serbo-Croatian war. It is an administrative data set from the Ministry of Veterans that contains family and war related variables about every soldier. Not all of observations is used in the analysis. The analysis sample is limited to whose who: i) have children; ii) their children were in the school data. There is no sample selection problem in the selection because the analysis is still on the universe of children, but on the youngest group[26]. The age range of children in high school is from 14 to 19 years old, but the long term effect might be from minimum of 12 years to 20 years after the incidence depending when the death happened. War related variables are available for every soldier: days in the military, days in combatant and non-combatant sectors, unit, rank [27], date and place of incidence (death or injury), type of death or injury. Family level data that is considered for fathers and children includes: gender, date and place of birth. Other family level variables include: number, age and gender of all children in the family, family composition, father's age and income from military pensions[28]. In the robustness checks sections I also utilise: date of entry and exit from the army, and type of exit.

School data

School data comes from a registry of all elementary and high school students in Croatia from 2008 to 2014. It is an administrative data from the Ministry of Science, Sports and Education. Veterans' children were matched in this dataset through social security numbers. This research uses the universe of soldier's children who were in the data in any year of the study of the observed period. The school data includes: gender, nationality, school, type of school, type of program, class, grades, teachers, absence in hours per school year, within and outside school activities and school behaviour.

The two datasets combined allow a rich selection of controls: father's age at child's

[26]The war was from 1991 to 1995 and the school data starts from 2008, so I still analyse all the children, but the focus is on the lower tail of the distribution.

[27]Rank data is available for deceased soldiers.

[28]By the Law for Veterans up to 2012 widows were not able to re-marry if they wanted to keep the pension from their deceased husband. Even if they did live with some in their household i.e. there was a substitute father figure, it would only imply that the negative effects are underestimated i.e. much larger.

birth, father age at child's birth squared, the number and gender of children[29], family income per capita, year of birth of a child, year of birth of a child and gender interaction, birth order, whether the child was last born and gender of a child.

Hospitalisation data

Hospitalisation data is a registry of all hospitalisations of soldiers' children from 2006 to 2015. It contains the date, duration and type of hospitalisation[30]. Military data and school data combined make an unbalanced panel, while hospitalisation and military datasets form a cross-sectional count data.

Outcome variables

Outcome variables used are divided into two main groups: education and health outcomes. I observe yearly grades per subject for each child in the registry for high school and calculate yearly average GPA. Additionally I observe yearly high school absence and high school behaviour grade. These three measures are the main education outcome that I use in my analysis. Next, in accordance with WHO International Statistical Classification of Diseases and Related Health Problems I focus on outcomes connected with risky behaviour such as "injury, poisoning and certain other consequences of external causes" classified as S00 to T98. To be able to capture both the intensive and the extensive margin I focus on probability of being injured and number of injuries.

[29]Even though children who finished the school before 2008 are out of the school analysis, nevertheless they are in the data and controlled for through number of children in a family.

[30]In accordance with the World Health Organisation:International Statistical Classification of Diseases and Related Health Problems 10th Revision.

1.5 Results

The results section is divided into several parts. The first section analyses the importance of family income as a channel of effect. The second section provides insights on balancing tests. The third section investigates the effects of paternal mortality on: high school GPA, high school behaviour, high school absence and hospitalisations. The fourth part is focused on series of robustness checks. The fifth part provides evidence of the importance of timing of paternal mortality. The last two parts test the effect of particular level of father's disability and differential sibling exposure to paternal time investment on children's outcomes.

1.5.1 Family income as a channel of effect

Remediation programs and policies serve to attenuate the initial damage of the shock of a father's death and to dampen further damage in the later stages of a child's life. According to Currie and Almond (2011) the success of remediation policies depends on the amount of initial damage from the shock, a child's factor productivity, share of investment in the period of the shock and elasticity of substitution of investment between the first and second period. Although, this research improves on past studies by controlling for financial income of families, it is imperative to elaborate on this channel as past research has highlighted its importance.

In addition to psychological shock, the father's death also affects a child also through lessening time and financial investment. A secondary effect is that the lack of a father raises the mother's opportunity cost, which in return, can influence a mother to spend less time with a child. Croatian veterans' families were entitled to a military pension[31] depending on the degree of the disability of the father and deceased status for affected families. The uniqueness of this context is that the cash transfers to veterans' families addressed budgetary problems without necessarily changing the production technology, so one test is whether family income differed between deceased and non-deceased soldiers' families. Deceased soldiers' families sole income was the military pension that widows were receiving, while for non-deceased soldiers' families, fathers received military pensions and mothers worked on the labour market. I only do not observe mothers' income for

[31] By the Law of Rights of the Croatian military veterans and their families; paragraph 26, beneficiaries of military pensions were forbidden to receive any other income while receiving military pensions. Non compliance would mean losing the military pension.

disabled families, while I observe the entire family's income for deceased soldier's families i.e. military pensions widows were receiving. That should not pose a significant problem since the military pensions received by disabled soldiers were high and would make a large share of family's income. Secondly, I observe the disability level of each soldier so the robust coefficients can be estimates as shown in Tables 13 and 14.

Figures 8 and 9 show that both total and per capita pension income of deceased soldiers' families were more than double that of their non-deceased counterparts. The blue line shows an average per capita income for a Croatian family with both parents working in the observed period[32], while the red line shows double that amount. It is important to highlight two things. First, widows were, on average, compensated more than double when compared to families of disabled soldiers. Second, both disabled and deceased soldiers' families were receiving solely from pensions more than what an average Croatian family would earn on the job market. The same pattern is visible in Figure 1 if we observe military pensions by disability levels. This leads to a unique setting, in which, unlike Kalil et al. (2015), paternal mortality did not lead to a secondary effect of changing the mother's post mortem labor market choices to compensate for the lessening of financial means, but rather the only effect is in the lack of a father's time investment.

As stated in Currie and Almond (2011) it is difficult to find examples of remediation policies that increase incomes without potentially having a direct effect on outcomes[33], so reduced form estimates would be joint estimates of paternal mortality shock and remediation income transfers[34]. Since they work in opposite directions, estimates of the paternal mortality shock in this empirical strategy are potentially underestimated[35].

1.5.2 Balancing tests

Tables 1 to 4 present the results when I run balancing tests to verify that there are no observable differences in the characteristics of children and their families, who experience the death or the disability of their father. I compare these characteristics before the war and not at time of death/injury[36] for two reasons. The Serbo-Croatian war started

[32]Data from Statistical Office of Croatia.

[33]Fletcher and Wolfe (2016); Amato and Booth (1997) find a positive effect of income on children outcomes.

[34]According to the theory and empirical evidence listed in McLanahan et al. (2013) they work in opposite directions. Paternal mortality shock produces negative effects, while income produces positive effects on children's outcomes.

[35]Nevertheless in the section 5.3. family income is included in series of robustness checks.

[36]This only affects time variant variables like age.

in spring of 1991 and the available census data is from 1991, making it the ideal pretreatment comparison. The second reason is that making a comparison from the time of death/injury would exclude the uninjured group from the analysis.

The first part of the analysis compares family level characteristics across two comparisons: Tables 1-2 and Appendix Table 1. Appendix Table 1 presents statistically significant differences between fatherless families and families that have a father, either injured or non-injured. Although the differences are statistically significant, they are rather small in magnitude. For the first part of the analysis, I will compare fatherless families and families that have a father, either injured or non-injured. The reason to focus on this type of a comparison is the weighting between very precise comparison groups and interpretation. As is visible in the rest of this section, higher levels of disabilities are statistically no different from the fatherless group. There is a tradeoff between interpretation and having the right comparison group for the killed fathers in the war. Interpretation wise they might have a non-standard interpretation of being fatherless versus having a disabled father. Both research questions are important, so I will use higher level disabilities and uninjured interchangeably as a baseline group in my econometric specifications. Table 1 shows that families of fathers with higher level disabilities are statistically no different from the fatherless families. The cutoff of significance varies from one family characteristic to another, but in general they all support the use of high level disability groups as a statistically valid comparison to fatherless families.

The second part of the analysis compares village/city level characteristics across the same comparisons. I do not observe pretreatment family income, but I observe year and place of birth of all children, for all families. Based on that I infer place of residence before the war to the lowest level of zip code. From this analysis it is possible to gain some insights into what type of neighbourhoods families were living in. For family level characteristics, Appendix Table 2 presents statistical differences across fatherless families and families that have a father, either injured or non-injured. Tables 3 and 4 reports that families whose fathers sustained higher level disabilities families are statistically no different from fatherless families.

1.5.3 Effects of paternal mortality on long-run outcomes

Tables 5 - 8 present the results of the effect of a father's death on children's high school GPA, absence, behaviour and hospitalisations. Estimates show significant and negative

effects of a father's death on all forth-mentioned children's long-run outcomes. Children who have lost a father have, on average, per school year, a 0.129 lower high school GPA, are 13.862 hours more absent from school and have worse school behaviour by 0.077. Also, fatherless children are 1.36 times more likely to incur an injury requiring hospitalisation than children with a father. On the intensive margin, fatherless children experience 0.015 higher average number of injuries. As seen in tables 5 - 8, the results are very robust to inclusion of different sets of controls. Remarkably, I find no influence of the father's death on their daughters' GPA, while there is significant influence on sons. The greatest difference is in absence from high school, where boys have, on average, 26.905 absent hours during a school year, while girls have 21.905. These findings agree with past research into disruptive behaviour and gender differences in single-mother families by Bertrand and Pan (2013). They find that boys do especially poorly in broken families. According to them, differences in endowments explain a small part of boys' non-cognitive deficit in single-mother families. This raises an important question, which has not been answered in past research, whether the gender differences in reaction to early childhood shocks are biological, that boys react differently to the same types of shocks or that the outcomes are related to responsive investment, meaning that parents are gender discriminatory when it comes to post shock investment. In section 3.3. I relax the assumption of no responsive investment and provide a discussion on possible mechanisms. Another reason boys might be more affected by their father's death lies in the transmission process itself. There might be a gender homophily in the transmission process, where a parent of the same gender as the child is more efficient in transmitting the skills. One study that goes along the line of the transmission process of school attainment is Kalil et al. (2015). They used within family variation in father exposure that occurs across siblings in the event of a father's death and find that longer paternal exposure amplifies the father-child association with boys being affected more.

1.5.4 Robustness checks

This section presents results that test the robustness of the main findings across children outcomes divided into school outcomes and hospitalisations.

Type of high schools

For school outcomes, my main econometric specification in equation (1) examined the

effects over the set of all high schools that children were attending. My data allows me to test over different types of high schools and even programs. I wanted to investigate how fatherless children cope in more competitive environments, so I focused my analysis on gymnasiums. Appendix Table 4 to 6 column 8 show the differences across gymnasiums and the results are slightly different. Fatherless children in gymnasiums have a 0.14 lower GPA per year than children with fathers, which is not statistically different from 0.129 for all schools. High school absence is still positive and significant at 9.276, but a bit lower than the estimate for whole sample of schools, which should be expected since we are testing the "best" schools. One result that surprises is that fatherless children in gymnasiums have worse behaviour scores relative to the set of all schools. Nevertheless, results once more show that the negative effect of the loss of a father across all schooling outcomes remains present, no matter the quality or type of high schools, and the differences between school types are negligible. In my main analysis I also used school FE to exclude any unobserved variable on the school level. Since school choice is to some extent endogenous use of school FE might be over-constraining. Therefore, I ran separate set of regressions that did not include school FE and as it is visible in Appendix Tables 4 - 6, column 13 the results are not statistically different from the main specification.

Family income

Family income is one of three channels through which a child may be influenced by a paternal mortality shock. As already discussed in Section 5.1. families without a father were compensated, so family income as a channel is not dominant, since there is little variation within the population of fatherless families[37] due to military pensions. It is visible in Appendix Tables 4 to 6, column 9 that inclusion of family income as a control variable only slightly changes the magnitude of the coefficient, but in the same direction. All three outcomes are lower in magnitude once family income is controlled for, but the outcomes are not statistically different.

Draftee and volunteer fathers

The Serbo-Croatian war lasted from spring of 1991 to the end of 1995. During that period, the army was composed of volunteers and draftees (Fig 4 and 5). Volunteers self-

[37]The lower bound for family income of fatherless families was still 50 percent higher than that of the average 4 member family, where both parents worked.

selected into the army, while draftees were selected through a draft procedure[38].These two ways of entering the army potentially signal some fathers' unobserved characteristics that might be driving the results. For this reason I ran two separate regressions: one for volunteer and one for draftee fathers. Fatherless children of volunteers have a 0.126 lower GPA than children of volunteers with living fathers, while fatherless children of draftee fathers have a 0.108 lower GPA than children of draftees with fathers. Appendix Table 5 shows that fatherless children of draftees and volunteers have 13.629 and 15.422 respectively, more hours absent than the children with fathers. Lastly, in Appendix Table 6 shows that once again the children of deceased draftees have a less negative effect of 0.078 than those of deceased volunteers 0.083 in terms of school behaviour. For all three school outcomes children of volunteers who died are relatively more affected by their father's death than draftee's children, but if we look at the confidence intervals there is no significant difference in the coefficient values. Furthermore, analysis of draftee's children is especially important since the quasi-random draft procedure allows generalisation of their results on the entire population of Croatia.

War exposure and timing of entry to the army

According to Fig 6 and 7 timing of entry into the army mattered, since it might have been that by luck a soldier served during a peaceful time, or with bad luck, during severe fighting. It is visible that there were two spikes in terms of high fighting exposure during late 1991 and in summer 1995, when numerous soldiers died and were injured. For that reason, it is possible that timing of the entry into the army is correlated with some soldier's characteristics and which might influence the estimates. For instance, if more risk prone men were selected during severe fighting, it might have happened that these men would be more likely to be injured or killed. Although, my empirical strategy resolves this issue, it is useful to test whether some groups are overrepresented in the sample of injured and dead and how this influences the results. For this reason, I tested only men present in the army during high war exposure, the times of spikes in graphs 6 and 7. The results show no statistical difference in coefficient values between the main results and the sample of children whose fathers were in the army during high exposure. GPA estimates in Appendix Table 4 show a negative effect of 0.135 of the loss of the

[38]Detailed analysis on the structure of the Croatian army, volunteering and draft procedure appears in Jurajda and Kovac (2016).

father on a child. Fatherless children have 14.704 higher school absence per year and 0.049 worse school behaviour. This suggestive evidence shows that the timing of entry into army did not matter for my results, i.e., that the subpopulation of soldiers that were injured or died during high war exposure is no different from the entire population.

Hospitalisations and injuries

Hospitalisations are included in a separate analysis of robustness checks, because of the different setting of outcome variables of children, and because the data is not in a panel setting as are school outcomes. Childhood injuries are a common proxy of risky behaviour in the literature, but they can be difficult to interpret. For instance, more active children can simply have more injuries, which may not a bad signal, but can be due to behavioural issues. My rich data allows me to test this research question by controlling for school activities. I excluded children enrolled in any formal high school activity and focused solely on children with no activities. Fatherless children not enrolled in any school activity have still 1.314 times higher probability of being injured than non-orphan children which is not statistically different from 1.36 for the entire population. Evidence shows that being injured is not determined by whether a child is engaged in any school activities, which indicates that children without a father are more prone to injuries beyond the scope of their everyday activities. Inclusion of family income as a control variable reduces the estimates slightly, but fatherless children are still 1.281 more likely to be injured than children with fathers. Once more income channel reduces the estimates, but the estimates remain not statistically different from our main specification. The last three regression outputs test for war related circumstance that might influenced fathers. Timing of entry into the army, draftee and volunteer statuses of fathers had insignificant effects on children's injuries.

Military unit analysis

As a last robustness check I focused on military unit analysis, since the use of military unit FE as an important factor of my empirical strategy. I calculated the average number number of soldiers across all military units and constrained my set of regressions on small sized units. The underlying assumption is that it should not matter for the state of being killed and highly disabled comparison, since it is exogenous to individuals, but it might have an effect on the baseline group. For instance, soldiers in smaller units

might have a greater interpersonal cohesion which would make the psychological shock of experiencing war carnage bigger or smaller shock for surviving/disabled soldiers than in the bigger units[39]. Hence the baseline comparison of soldiers with different levels of disability across different unit size could have a differential treatment on children. By focusing my analysis on small units, less than 300 soldiers, Appendix Tables 4-6 column 14 I find no statistically difference with comparing it with the main specification across all observed outcomes.

1.5.5 Prenatal and postnatal exposure to paternal mortality shock

This section provides an in-depth analysis of channels through which children might have been affected by a father's death. The income channel has been discussed in the previous two sections, and this section discusses time investment of the father and psychological shock. To disentangle the two effects, I extended my main econometric specification and included the timing of the father's death or injury. Balancing tests provide evidence that once war exposure is controlled for, through comparison of fathers that served in the same unit, that the state of being killed or severely injured is exogenous to an individual during combat, so estimates should be consistent and unbiased. Additionally, using the time variation in a child's exposure to the father, it is possible to estimate its effect. The more time a child spent with his/her father, the more the child would benefit. On the other hand, older children may have stronger emotional attachments to the father, which could cause a greater emotional trauma when the father is injured or killed. Obviously these two effects work in opposing directions and the estimates are an interaction of both effects. To remedy this identification problem, I used a very narrow window of in-utero and first year exposure to paternal mortality shock. During the in-utero period, a child can only be affected directly through the psychological shock of the mother, while one year old children are affected through the first year time investment from the father[40]. Time investment within the first year is the shortest amount a child could receive from the father, but it is still non-zero, so as a robustness check I used a variation in duration in the army before the death for fathers dying within a child's first year to pin down the time investment to zero. This way comparing in-utero with first year estimates gives

[39] In fact, Costa and Khan (2010) find the opposite that men who served during the US Civil war in more cohesive units were less affected by unit level exposure to carnage.

[40] During the first year there is a direct effect through a high cortisol levels of the mother while in-utero. Richardson et al.(2015) show that spousal loss has a significant effect on high cortisol levels of the bereaved spouses.

us roughly the estimate of a psychological shock. Also, one should keep in mind the set of cases made in section 3.3. to neglect the influence of responsive investment, so I will implicitly follow the theoretical model of Currie and Almond (2011) in this respect.

Results show that the timing of paternal death and length of exposure to the father have significant effects only during the in-utero period. For high school GPA, behaviour and injuries, the in-utero period is also the only significant period, while for high school absence, additionally the first and second year of life are significant. Narrowing down the analysis to only the in-utero period and right after birth, and if assumptions of non discriminatory responsive investment and control for soldiers absent in the child's first year hold, I estimate the effect of in-utero psychological shocks on children' outcomes. The GPA coefficient for children whose fathers died when they were in-utero is 0.173 lower for fatherless children, which is around 40% higher magnitude than for the population as a whole in the main specification. High school behaviour of children whose father died when they were in the in-utero period is 0.111 lower for fatherless children and that is higher order of magnitude than negative 0.077 of the entire population. The biggest scale effect is on the probability of being injured, in which children experiencing paternal mortality shock during the in-utero period are 3.086 more likely to be injured than the children of injured fathers, which is around a 2.5 times stronger effect than in the entire population. For high school absences, fatherless children have 16.292 more absences, which is almost on par with the entire population.These results show the importance of the in-utero period and the effect of psychological shock from a father's death on later outcomes. They give evidence of the effect of another channel beyond the absence of the father.

Next to the in-utero period, the age group of four years of age and older provides, although insignificant, nevertheless interesting results. Tables 9 to 12 for all children's outcomes suggest two to three times stronger magnitudes for high school absences and school behaviour, than the in-utero period, and for GPA and injuries they are of the same magnitude. These results give suggestive evidence that for older children there is a cutoff age of a child at father's death, when emotional attachment to a father plays a significant role and can be an evidence of a trauma mechanism.

In-utero shocks by gender

From the previous section it is visible that exposure to psychological shocks during

the in-utero period has a strong and negative effect on children's outcomes in later life. This section explores whether boys and girls react differently. An important variable that is unobserved in this research is the responsive investment of mothers' after the death of a father. First, it is not known whether mothers in any way decrease or increase investment conditional on child's gender after the death of a father. Second, I consider whether mothers invest more in children exposed to a paternal mortality shock during the prenatal or postnatal period. The second assumption should not be problematic since I am comparing children experiencing a prenatal shock across gender, but the first assumption matters since I consider the psychological effects by gender.

Appendix Table 3 shows that for GPA, school behaviour and injuries, girls are affected more than boys. Girls who experienced paternal shock while in utero have 0.337 lower GPA, 0.270 worse behaviour and 2.717 higher probability of being injured than girls of injured fathers. School absence is the only outcome in which boys feel a stronger effect in magnitude than girls i.e. 25.768 more absent than boys of injured fathers.

1.5.6 Father's disability level and children's outcomes

Lack of a father's presence has a significant and negative effect on all estimated children's outcomes. Additionally, I observe that the in-utero period is highly significant, which testifies to the importance of that period and the impact of psychological shock. Since the baseline group so far was an aggregate across all disability levels, now I will look at the effect of each particular level of disability on children's long-run outcomes to test whether it will change the estimated effect of father's death. Figure 2 graphically portrays the result for high school absence and it is visible that there is a cascading effect of increase of father's disability level on a child's high school absence. Nevertheless, the effect of the father's death is still the strongest. Same pattern is observed for high school GPA and school behaviour in Appendix Figure 1 and Figure 2. Table 13 shows in some cases the significance of 100 % disabled fathers[41] [42] . This testifies to the difficulties of growing up with a seriously disabled father and I will provide additional evidence in the next section.

[41]The model in Table 13 uses dummy variables for the father's level of disability up to 20 %, with uninjured as baseline group. For exposition purposes these estimates are omitted but available upon request.

[42]The difference between two categories of 100 % disabled fathers is that category I had mothers taking care of their husbands and being paid for it by the Ministry while the category II mothers were working on the labor market.

High school GPA in Table 13 remains about the same as the main specification with 0.132 negative effect. The same holds true for high school absences with 13.525 higher absence for fatherless children, 0.066 worse high school behaviour and 1.437 times higher probability of sustaining an injury that ends in hospitalisation than children with fathers.

1.5.7 Differential sibling exposure to father's time investment

Specifics of the initial identification strategy and available data do not allow the use of family level fixed effects in a standard way, since the father is not present. Still, to utilise the information hidden on a family level, I created a permutations of all possible sibling pairs within each family and use the random timing of deaths/injuries across families to test the effect of father's time investment on education outcomes[43]. The independent variable is the difference in years spent with a father between an older and a younger sibling, where I use the fact that different fathers were dying and getting injured at different ages of sibling pairs across families. The dependent variable is the difference in education outcomes between an older and a younger sibling. The interpretation of the coefficient from this type of an analysis is the effect of marginal increase of one more year of time investment for an older sibling and the effect it has on the difference in educational outcomes. I ran separate regressions by killed status and levels of disability to test the heterogeneous treatment effect across different groups of fathers. Table 14 shows that for sibling pairs without a father and higher levels of disabilities there is an insignificant effect of time investment of a father on education outcomes. As the level of disability of a father decreases the effect of one more year spent with a father becomes more significant. It is not possible to state whether this is the real effect of children benefiting more through time spent with healthier father or it is due to lower levels of observations for higher level of disabilities. Nevertheless, we can focus on the magnitude and the direction of the effects. Although insignificant, sibling pairs without a father have the biggest magnitude across all three education outcomes, which intuitively is correct because it is a complete absence of a father. Contrary to that, disabled soldiers are still investing their time into their kids, but the transmission process can be less efficient as we increase the disability level. For the lower levels of disabilities there is no statistical difference in the effects what implies that the transmission process is not affected. The directions of the majority coefficients for GPA are positive, meaning that the increase

[43]Hospitalisation is a binary variable and therefore out of the scope of this analysis.

in one more year of time investment for an older sibling has a positive effect on older sibling's GPA. For high school absence and behaviour a one more year of time investment from a father has the opposite effect, high school absence increases while high school behaviour decreases i.e. becomes worse.

1.6 Conclusion

This paper analyses the effects of the father's death on children's long-run outcomes and exploits several novel identification strategies to estimate separate channels through which the father's death may have influenced a child. Due to the relatively small number of natural death incidences in everyday life, most of the literature is confined to using large administrative datasets that span over 30 years and more. This research uses a narrower timeline by exploiting the paternal mortality shocks that occurred during the Croatian-Serbian war, a deadly conflict that was the first war on European soil after the World War II. The use of this type of data makes a new methodological approach, and thus improves on past research. Comparing children of soldiers, who served in the same unit across the two categories: killed or seriously injured, I control for any unobserved variable that is potentially correlated with the father's probability of dying and long-run outcomes of the child. Furthermore, quasi random variation in state of being killed or seriously injured is considered to be exogenous to an individual.

I find negative effects of father's death on all long-run outcomes of children: hospitalisations for injuries, high school GPA, high school absenteeism and behaviour. In the second part of my study, I use the age of a child at the time of the father's death to estimate the importance of length of exposure to the father. I find that only the in-utero period provides consistently significant results across all observed children's outcomes. Remarkably, during the in-utero period, girls are affected more by the father's death than boys. It is not possible to say with certainty whether these gender differences are in fact biological or due to differences in family's responsive investment by gender after paternal mortality shock, but I elaborate on different cases based on the theoretical model of Currie and Almond (2011) that I am using. Also, by focusing solely on children who experienced their father's death during their first year of life or the in-utero period it is possible to estimate the effect of psychological shock of the mother on children's outcomes. Empirical evidence shows that the psychological shock of the spouse's death during pregnancy has a significant and negative effect on all children's outcomes. Fur-

ther, the group of children, at the age of four and more at the time of the father's death, exhibits, although insignificant, but the strongest magnitude estimates for all children's outcomes. This group has already attained a significant amount of time investment from their fathers, so it is unclear which channel has the overwhelming effect. One of the possible explanations might be that, as children are older, they become more emotionally attached to their fathers, so the psychological shock is of a greater scale than the father's time investment, making these results evidence of a trauma mechanism.

As shown in this study, the importance of a particular channel through which a father's death influences a child varies conditional on the age of the child. While my findings may not generalise to all other possible types of fathers' absenteeism like divorce or incarceration, I believe that this study sheds some light on mechanisms through which a child may be influenced by father's absence. It also highlights the importance of the child's age at the time of the father's death and which channel/s matter the most.

Finally, surviving spouses of those killed or injured in the Croatian war were well compensated, so that the death of a father did not have a negative effect on household incomes. Despite the large financial compensations to fatherless families, I still find strong negative effects on all children's outcomes. This provides evidence that there is a finite level of substitutability between financial investment and time investment of a father. Therefore, future policies should be more focused on compensating the time investment of a father and remediation of psychological shocks, in addition to providing cash transfers to families.

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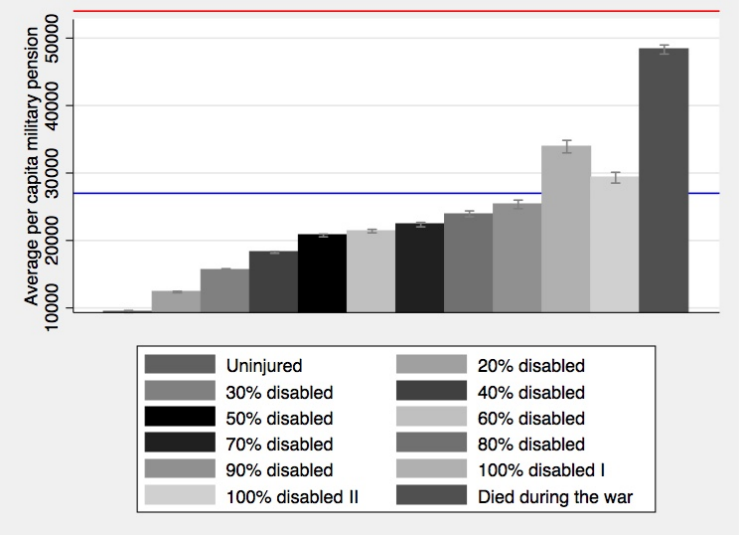
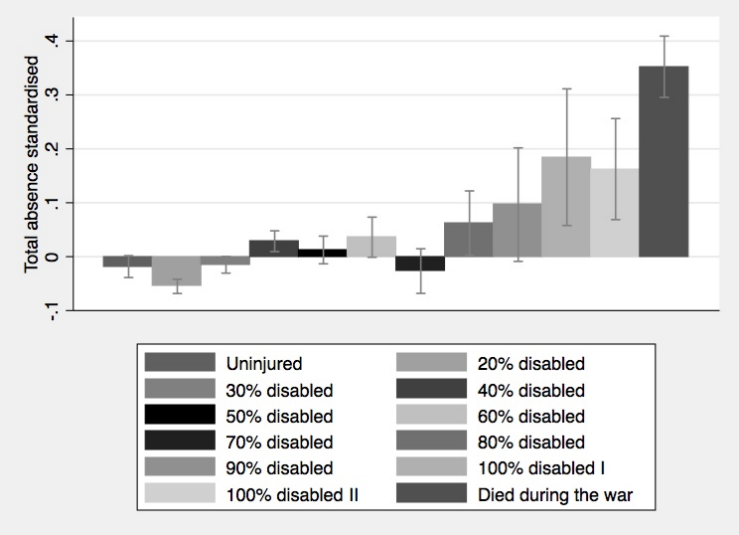
Figures

Figure 1.1: Military pensions by mortality and disability status



Note: The blue line shows an average 4 member family per capita income. The red line shows double.

Figure 1.2: School absence by mortality and disability status



Note: Data is standardised and in units of standard deviations

Figure 1.3: Geographical map of the Serbo-Croatian war

Figure 1.4: Entry into Croatian Army by type of soldiers

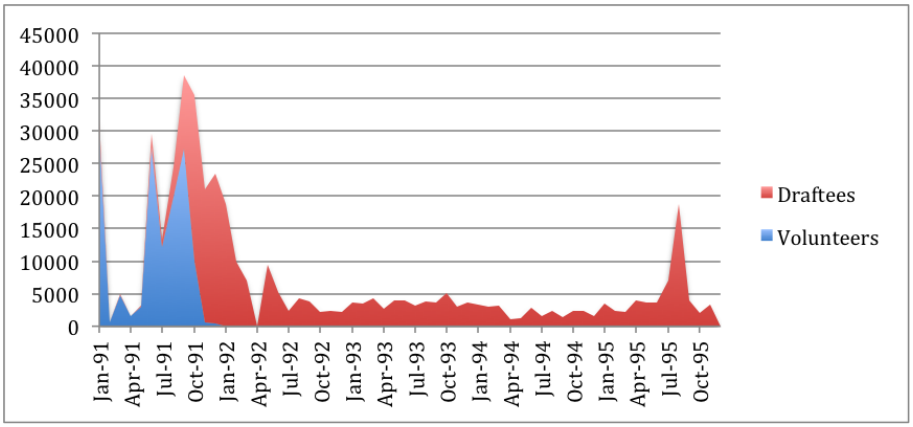


Figure 1.5: Number of soldiers in Croatian Army by type of soldiers

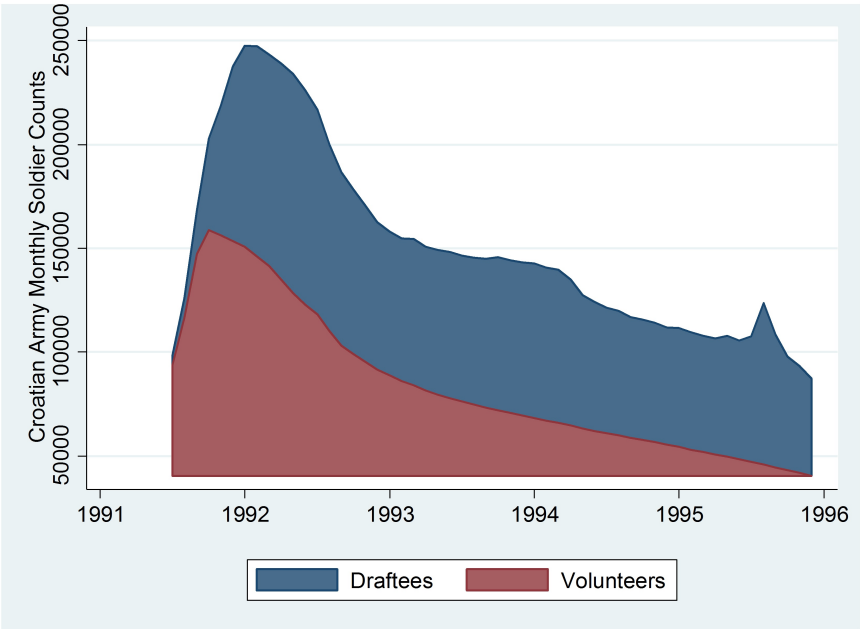
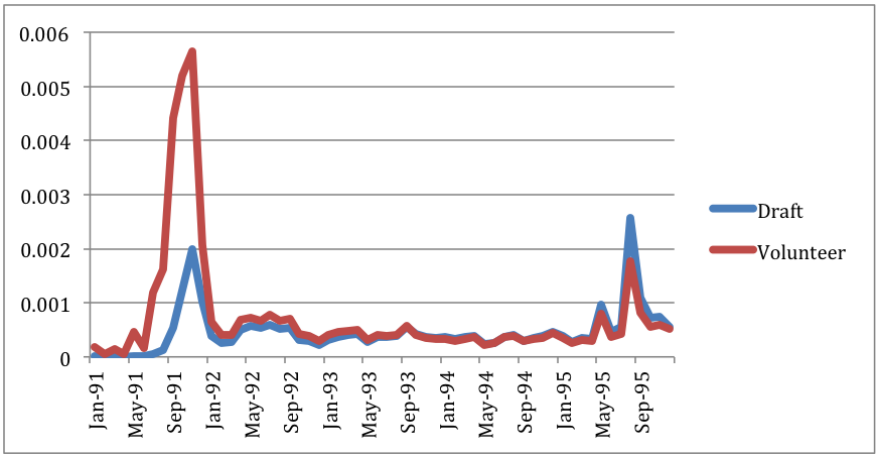
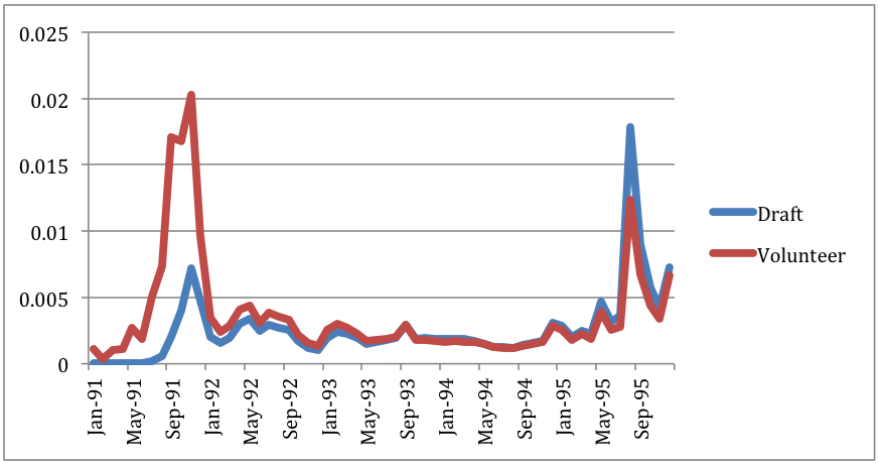


Figure 1.6: Monthly probabilities of dying during the war by type of soldiers



*Note: Probabilities are calculated based on the set of units within the analysis

Figure 1.7: Monthly probabilities of injury during the war by type of soldiers



*Note: Probabilities are calculated based on the set of units within the analysis

Figure 1.8: Yearly amounts of total military pensions

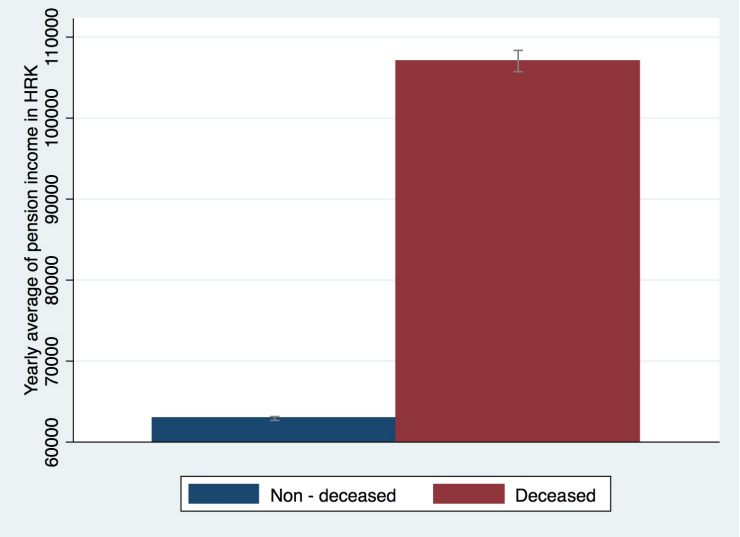
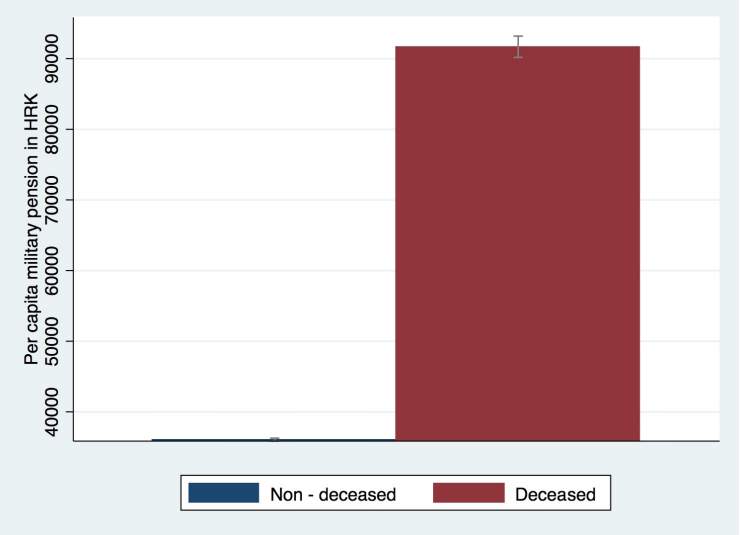


Figure 1.9: Yearly amounts of per capita military pensions



Tables

Table 1.1: Means by Disability Levels

	Family level variables before the war						
	Killed	100% II	100% I	90%	80%	70%	60%
Number of kids	1.196	1.253	1.214	1.275	1.229	1.370	1.261
	(0.013)	(0.058)	(0.055)	(0.059)	(0.034)	(0.033)	(0.023)
Share of male kids	0.514	0.594	0.464	0.568	0.439	0.537	0.517
	(0.015)	(0.052)	(0.062)	(0.060)	(0.038)	(0.027)	(0.023)
Average age of kids	1.685	1.941	1.693	2.029	1.642	1.595	1.859
	(0.046)	(0.243)	(0.210)	(0.309)	(0.134)	(0.107)	(0.086)
Father's age	33.705	34.118	35.741	33.868	34.374	34.126	33.756
	(0.158)	(0.424)	(0.928)	(0.467)	(0.294)	(0.218)	(0.189)
Mother's age	25.050	23.750	18.25	25.428	20.857	19.521	23.947
	(0.974)	(2.393)	(1.729)	(2.486)	(2.382)	(1.110)	(1.100)
Observations	989	150	95	134	293	502	817

**Note:* Groups highlighted red are statistically different from the "Killed" group. Mother's age is the only variable based on the information from a sample. Number of observations vary across different characteristics due to random missing observations (less than 2% on average)

Table 1.2: Means by Disability Levels

	Family level variables before the war				
	50%	40%	30%	20%	Uninjured
Number of kids	1.255	1.209	1.243	1.264	1.246
	(0.027)	(0.039)	(0.040)	(0.027)	(0.039)
Share of male kids	0.521	0.496	0.497	0.496	0.498
	(0.017)	(0.012)	(0.010)	(0.009)	(0.014)
Average age of kids	1.723	1.925	1.831	1.899	1.839
	(0.068)	(0.047)	(0.040)	(0.042)	(0.078)
Father's age	33.880	33.838	33.850	34.040	33.949
	(0.127)	(0.089)	(0.078)	(0.068)	(0.110)
Mother's age	22.531	22.020	22.603	21.959	21.267
	(0.734)	(0.445)	(0.381)	(0.345)	(0.512)
Observations	1 429	2 917	4 017	5 109	2 121

**Note:* Groups highlighted red are statistically different from the "Dead" group. Mother's age is the only variable based on the information from a sample. Number of observations vary across different characteristics due to random missing observations (less than 2% on average)

Table 1.3: Means by Disability Levels

	Family level variables before the war						
	Killed	100% II	100% I	90%	80%	70%	60%
Population size	66 068.4	72 528.3	65 369.12	63 624.3	72 224.9	73 483.1	88 603.7
	(2 595.4)	(13 724.9)	(13 986.1)	(12 228.6)	(8 578.7)	(7 172.4)	(6 283.1)
Share of Serbs	0.147	0.134	0.119	0.113	0.150	0.138	0.149
	(0.002)	(0.014)	(0.011)	(0.010)	(0.009)	(0.008)	(0.006)
Commerce	0.089	0.087	0.090	0.091	0.091	0.092	0.094
	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Agriculture	0.134	0.133	0.134	0.123	0.140	0.130	0.124
	(0.001)	(0.010)	(0.009)	(0.007)	(0.005)	(0.003)	(0.003)
Forestry	0.011	0.018	0.013	0.016	0.011	0.009	0.012
	(0.000)	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)	(0.000)
Observations	989	150	95	134	293	502	817

**Note:* Groups highlighted red are statistically different from the "Killed" group. Number of observations vary across different characteristics due to random missing observations (less than 2% on average)

Table 1.4: Means by Disability Levels

	Family level variables before the war				
	50%	40%	30%	20%	Uninjured
Population size	76 590.9	78 314.9	75 080.8	59 538.98	58 428.65
	(4 280.4)	(3 084.4)	(2 834.5)	(2 478.2)	(4 369.8)
Share of Serbs	0.137	0.130	0.128	0.118	0.135
	(0.004)	(0.002)	(0.002)	(0.002)	(0.005)
Commerce	0.093	0.090	0.093	0.093	0.091
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Agriculture	0.128	0.133	0.125	0.124	0.128
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Forestry	0.010	0.014	0.014	0.015	0.015
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Observations	1 429	2 917	4 017	5 109	2 121

**Note:* Groups highlighted red are statistically different from the "Dead" group. Number of observations vary across different characteristics due to random missing observations (less than 2% on average)

Table 1.5: Paternal Mortality and High School GPA

	Dependent variable: GPA per school year						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father died	-0.103***	-0.128***	-0.044	-0.107***	-0.130***	-0.056	-0.129***
	(0.027)	(0.039)	(0.040)	(0.027)	(0.039)	(0.040)	(0.028)
Family size	-	-	-	-0.004	-0.003	-0.015**	-0.009*
	-	-	-	(0.004)	(0.006)	(0.006)	(0.005)
Controls	-	-	-	-	-	-	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	yes	yes
Gender	all	boys	girls	all	boys	girls	all
Constant	4.076***	4.607***	4.035***	4.086***	4.622***	4.075***	3.318***
	(0.197)	(0.042)	(0.120)	(0.200)	(0.051)	(0.130)	(0.400)
Observations	68 465	33 688	34 777	68 465	33 688	34 777	68 320

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level. The baseline group are pooled disabled 20 to 100% and uninjured fathers.

Table 1.6: Paternal Mortality and High School Absence

	Dependent variable: Absence per school year						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father died	25.362***	27.379***	23.236***	24.489***	26.905***	21.905***	13.862***
	(3.507)	(4.746)	(4.463)	(3.552)	(4.668)	(4.615)	(3.402)
Family size	-	-	-	-1.224**	-0.669	-1.833***	-0.329*
	-	-	-	(0.491)	(0.682)	(0.648)	(0.629)
Controls	-	-	-	-	-	-	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	yes	yes
Gender	all	boys	girls	all	boys	girls	all
Constant	45.474	-6.127	43.921	47.519	-2.958	47.374	102.428**
	(35.053)	(3.342)	(34.544)	(35.154)	(4.806)	(34.493)	(44.044)
Observations	70 152	34 640	35 512	70 152	34 640	35 512	69 992

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level. The baseline group are pooled disabled 20 to 100% and uninjured fathers.

Table 1.7: Paternal Mortality and High School Behaviour

	Dependent variable: School behaviour						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father died	-0.169***	-0.176***	-0.156***	-0.169***	-0.179***	-0.160***	-0.077***
	(0.024)	(0.035)	(0.042)	(0.025)	(0.037)	(0.043)	(0.025)
Family size	-	-	-	0.001	-0.004	-0.005	-0.009
	-	-	-	(0.004)	(0.008)	(0.005)	(0.005)
Controls	-	-	-	-	-	-	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	yes	yes
Gender	all	boys	girls	all	boys	girls	all
Constant	3.110***	3.357***	3.130***	3.109***	3.378***	3.143***	2.918***
	(0.140)	(0.046)	(0.126)	(0.140)	(0.064)	(0.129)	(0.183)
Observations	68 975	33 921	35 054	68 975	33 921	35 054	68 828

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level. The baseline group are pooled disabled 20 to 100% and uninjured fathers.

Table 1.8: Paternal Mortality and Injuries

	Dependent variable: Injury and Number of Injuries					
	Injuries	Injuries	Injuries	Num injuries	Num injuries	Num injuries
Father died	1.360**	1.276	1.686	0.015*	0.017	0.014
	(0.183)	(0.205)	(0.572)	(0.008)	(0.014)	(0.011)
Controls	yes	yes	yes	yes	yes	yes
Gender	all	boys	girls	all	boys	girls
Observations	51 161	25 512	25 649	37 267	18 772	18 495

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; First three columns are incident rate ratios of Poisson model. Last three columns are OLS estimations. The baseline group are pooled disabled 20 to 100% and uninjured fathers.

Table 1.9: Father Exposure and High School GPA

	Dependent variable: GPA per year					
	(Uter)	(0-1)	(1-2)	(2-3)	(3-4)	(4+)
Father died	-0.173**	-0.061	-0.149	0.040	-0.120	-0.217
	(0.078)	(0.069)	(0.093)	(0.115)	(0.169)	(0.344)
Controls	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	yes
Constant	4.666***	3.067***	3.665***	2.713***	5.011**	2.013
	(0.698)	(0.555)	(0.851)	(0.776)	(2.287)	(1.416)
Observations	4 653	4 558	3 367	1 853	1 071	442

Note: Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by ***; SE are clustered at unit level.

Table 1.10: Father Exposure and High School Absence

	Dependent variable: School Absence					
	(Uter)	(0-1)	(1-2)	(2-3)	(3-4)	(4+)
Father died	16.292**	11.499**	13.206*	2.523	12.240	41.423
	(7.384)	(5.840)	(7.634)	(8.927)	(16.133)	(60.026)
Controls	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	yes
Constant	74.241	126.284***	193.902***	168.300	547.448***	283.505
	(63.015)	(43.313)	(73.230)	(124.836)	(189.929)	(213.581)
Observations	4 785	4 672	3 445	1 891	1 097	448

Note: Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by ***; SE are clustered at unit level.

Table 1.11: Father Exposure and High School Behaviour

	Dependent variable: School behaviour					
	(Uter)	(0-1)	(1-2)	(2-3)	(3-4)	(4+)
Father died	-0.111*	-0.020	-0.092	0.177	0.100	-0.525
	(0.066)	(0.050)	(0.069)	(0.107)	(0.165)	(0.353)
Controls	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	yes
Constant	2.922***	2.820***	1.694**	2.111**	5.860***	1.864
	(0.503)	(0.498)	(0.849)	(0.972)	(1.699)	(2.217)
Observations	4 696	4 596	3 394	1 886	1 084	451

Note: Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by ***; SE are clustered at unit level.

Table 1.12: Father Exposure and Injuries

	Dependent variable: Injuries					
	(Uter)	(0-1)	(1-2)	(2-3)	(3-4)	(4+)
Father died	3.086***	1.440	0.628	0.802	0.825	2.060
	(1.094)	(0.434)	(0.248)	(0.311)	(0.637)	(1.394)
Controls	yes	yes	yes	yes	yes	yes
Observations	2 132	2 276	1 815	1 015	658	368

Note: Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by ***; SE are clustered at unit level. The estimates are incident rate ratios of a Poisson model

Table 1.13: Paternal Disabilities and Children Outcomes

	Dependent variables:			
	GPA	Absence	Behaviour	Injuries
Father died	-0.132***	13.525***	-0.066**	1.437 **
	(0.030)	(3.609)	(0.026)	(0.221)
100% disabled II	-0.181***	6.258	-0.128***	1.114
	(0.058)	(4.957)	(0.048)	(0.293)
100% disabled I	-0.172***	11.367**	-0.096	1.508
	(0.057)	(5.470)	(0.067)	(0.618)
90% disabled	0.023	-1.897	-0.014	1.277
	(0.049)	(7.116)	(0.058)	(0.327)
80% disabled	- 0.344	5.083	-0.016	1.144
	(0.047)	(4.214)	(0.034)	(0.217)
70% disabled	0.030	-3.750	0.008	1.008
	(0.027)	(2.496)	(0.028)	(0.182)
60% disabled	0.001	0.302	0.003	0.859
	(0.029)	(2.431)	(0.023)	(0.132)
50% disabled	- 0.017	-0.570	0.005	1.138
	(0.023)	(1.950)	(0.018)	(0.130)
Controls	yes	yes	yes	yes
Year FE	yes	yes	yes	no
Unit FE	yes	yes	yes	no
School FE	yes	yes	yes	no
Gender	all	all	all	all
Constant	3.326***	99.848**	2.912***	-
	(0.406)	(44.156)	(0.185)	-
Observations	68 320	69 992	68 828	51 161

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *;
SE are clustered at unit level. The lower level disabilites(40-20%) are excluded from the table because of exposition purposes, but are estimated in this model and all insignificant. The baseline category in this estimation are uninjured fathers.

Table 1.14: Exposure to Father and Children's Outcomes by Sibling Pairs

	Dependent variables:			
	ΔGPA	ΔAbsence	Δ Behaviour	Observations
Independent variable: ΔTime Exposure				
Regressions by groups:				
Father died	0.049	8.570	-0.075	127
	(0.077)	(6.479)	(0.076)	
100% disabled II	0.023	1.173	-0.028	84
	(0.048)	(4.257)	(0.041)	
100% disabled I	-0.089	0.012	-0.004	48
	(0.062)	(5.586)	(0.056)	
90% disabled	0.047	-3.112	-0.039	60
	(0.089)	(8.829)	(0.072)	
80% disabled	0.026	-0.183	-0.009	155
	(0.046)	(3.246)	(0.038)	
70% disabled	0.010	-0.423	-0.047*	338
	(0.026)	(2.282)	(0.024)	
60% disabled	0.038*	2.183	-0.038*	489
	(0.021)	(1.742)	(0.019)	
50% disabled	0.009	4.174***	-0.055***	778
	(0.017)	(1.506)	(0.015)	
40% disabled	0.025**	1.928*	-0.044***	1 584
	(0.012)	(1.064)	(0.011)	
30% disabled	0.032***	1.201	-0.044***	2 350
	(0.009)	(0.840)	(0.008)	
20% disabled	0.025***	3.484***	-0.043***	3 063
	(0.009)	(0.699)	(0.007)	

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *;
Each observation is one sibling pair. Δ is the difference in dependent and independent variables between older and younger sibling for all possible permutations of siblings within a family. For each level of disability a separate regression was made.

1.8 Appendix

Table A1: Means by Killed or Alive

	Killed	Alive
Number of kids	1.196	1.249
	(0.013)	(0.004)
Share of male kids	0.514	0.501
	(0.015)	(0.004)
Average age of kids	1.685	1.849
	(0.046)	(0.020)
Father's age	32.705	33.942
	(0.158)	(0.037)
Mother's age	25	22.618
	(0.974)	(0.188)
Observations	989	17 584

**Note:* Groups highlighted red are statistically different from the "Killed" group. "Alive" group contains characteristics of both injured and uninjured soldiers

Table A2: Means by Killed or Alive

	Killed	Alive
Population size	65 374.2	73 487.7
	(2 551.3)	(1 314.5)
Share of Serbs	0.149	0.128
	(0.002)	(0.001)
Commerce	0.089	0.092
	(0.001)	(0.001)
Agriculture	0.134	0.127
	(0.001)	(0.001)
Forestry	0.011	0.014
	(0.000)	(0.000)
Observations	989	18 765

**Note:* Groups highlighted red are statistically different from the "Killed" group. "Alive" group contains characteristics of both injured and uninjured soldiers

Table A3: In-utero Paternal Shock and Gender Differences

	Dependent variables:							
	GPA	GPA	Absence	Absence	Behaviour	Behaviour	Injuries	Injuries
Father died	-0.092	-0.337***	25.768**	10.797	-0.019	-0.270**	0.707*	2.717***
	(0.095)	(0.128)	(11.005)	(14.069)	(0.123)	(0.117)	(0.392)	(0.818)
Controls	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	no	no
Unit FE	yes	yes	yes	yes	yes	yes	no	no
School FE	yes	yes	yes	yes	yes	yes	no	no
Gender	male	female	male	female	male	female	male	female
Observations	2 329	2 324	2 405	2 380	2 352	2 344	1 026	1 106

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level. Last two columns are incident rate ratios of Poisson model.

Table A4: Paternal Mortality and High School GPA 2

	Dependent variable: GPA per school year						
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Father died	-0.140***	-0.089***	-0.108***	-0.126***	-0.135***	-0.119***	-0.099***
	(0.051)	(0.031)	(0.045)	(0.045)	(0.008)	(0.033)	(0.037)
Family size	-0.014	-0.018**	-0.005	-0.010	-0.008	-0.022***	-0.008
	(0.009)	(0.007)	(0.014)	(0.006)	(0.008)	(0.006)	(0.008)
Controls	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	no	yes
Type of school	gymnasium	all	all	all	all	all	all
Family income	no	yes	no	no	no	no	no
Father type	all	all	draftee	volunteers	all	all	all
War exposure	-	-	-	-	high	-	-
Unit size	-	-	-	-	-	-	small
Gender	all	all	all	all	all	all	
Constant	2.154***	3.372***	3.977***	2.984***	2.971***	2.774***	1.940***
	(0.343)	(0.390)	(0.367)	(0.329)	(0.352)	(0.149)	(0.314)
Observations	22 007	60 611	19 660	48 660	42 732	68 320	44 397

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level.

Table A5: Paternal Mortality and High School Absence 2

Dependent variable: Absence per school year							
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Father died	9.276**	11.775***	13.629***	15.422***	14.704***	15.380***	10.791***
	(4.031)	(3.542)	(4.642)	(5.620)	(4.765)	(3.938)	(3.706)
Family size	-1.011	0.699	-0.036	-0.265	-0.287	-0.439	-0.519
	(0.938)	(0.755)	(1.327)	(0.763)	(0.711)	(0.787)	(0.700)
Controls	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	no	yes
Type of school	gymnasium	all	all	all	all	all	all
Family income	no	yes	no	no	no	no	no
Father type	all	all	draftee	volunteers	all	all	all
War exposure	-	-	-	-	high	-	-
Unit size	-	-	-	-	-	-	small
Gender	all	all	all	all	all	all	all
Constant	328.488***	100.575**	56.22*	185.781***	117.773*	143.932***	132.563***
	(58.162)	(44.280)	(31.471)	(30.274)	(60.408)	(13.289)	(43.341)
Observations	22 350	62 118	20 207	49 785	42 716	69 992	45 485

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level.

Table A6: Paternal Mortality and High School Behaviour 2

	Dependent variable: School behaviour						
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Father died	-0.118***	-0.047*	-0.078**	-0.083**	-0.049*	-0.075**	-0.065**
	(0.034)	(0.028)	(0.035)	(0.033)	(0.030)	(0.031)	(0.030)
Family size	-0.001	-0.013**	-0.014	-0.008	-0.011	-0.014*	-0.006
	(0.006)	(0.007)	(0.011)	(0.007)	(0.008)	(0.008)	(0.007)
Controls	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School FE	yes	yes	yes	yes	yes	no	yes
Type of school	gymnasium	all	all	all	all	all	all
Family income	no	yes	no	no	no	no	no
Father type	all	all	draftee	volunteers	all	all	all
War exposure	-	-	-	-	high	-	-
Unit size	-	-	-	-	-	-	small
Gender	all	all	all	all	all	all	all
Constant	1.897***	2.942***	3.893***	2.925***	3.105***	2.477***	2.901***
	(0.559)	(0.187)	(0.356)	(0.172)	(0.248)	(0.138)	(0.222)
Observations	22 245	61 066	19 779	49 049	42 072	68 828	44 715

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level.

Table A7: Paternal Mortality and Injuries 2

	Dependent variable: Injury				
	(8)	(9)	(10)	(11)	(12)
Father died	1.314*	1.281*	1.403	1.210	1.140
	(0.196)	(0.193)	(0.397)	(0.239)	(0.238)
Controls	yes	yes	yes	yes	yes
School activities	no	-	-	-	-
Family income	no	yes	no	no	no
Father type	all	all	draftee	volunteers	all
War exposure	-	-	-	-	high
Gender	all	all	all	all	all
Observations	35 563	45 675	13 903	31 772	27 702

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level.

Table A8: Paternal Mortality and Injuries 3

	Dependent variable: Number of injuries				
	(8)	(9)	(10)	(11)	(12)
Father died	0.012	0.009	0.015	0.007	0.002
	(0.008)	(0.009)	(0.018)	(0.013)	(0.011)
Controls	yes	yes	yes	yes	yes
School activities	no	-	-	-	-
Family income	no	yes	no	no	no
Father type	all	all	draftee	volunteers	all
War exposure	-	-	-	-	high
Gender	all	all	all	all	all
Observations	26 457	33 212	10 020	23 192	20 369

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level.

An Appendix Figures

Figure 1.1: GPA by mortality and disability status

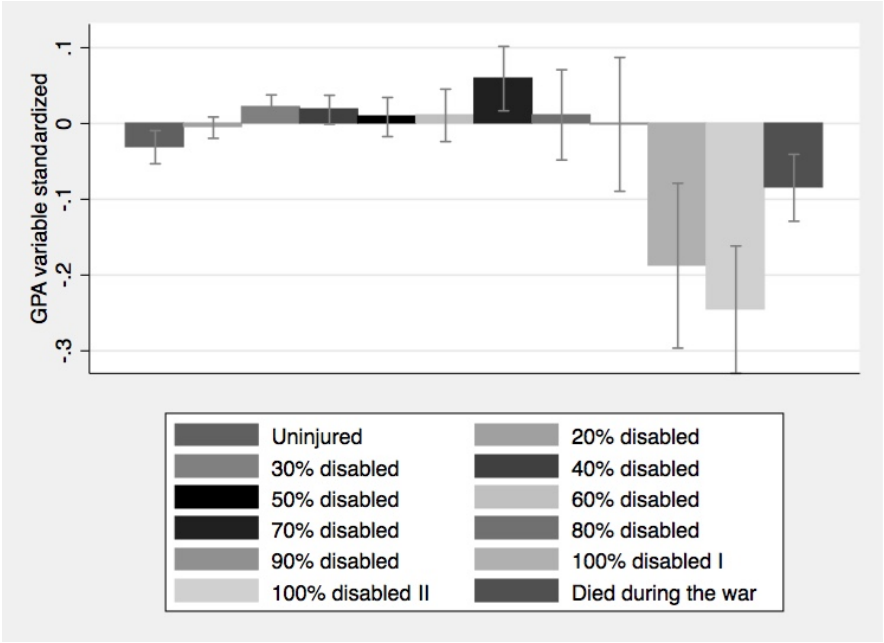
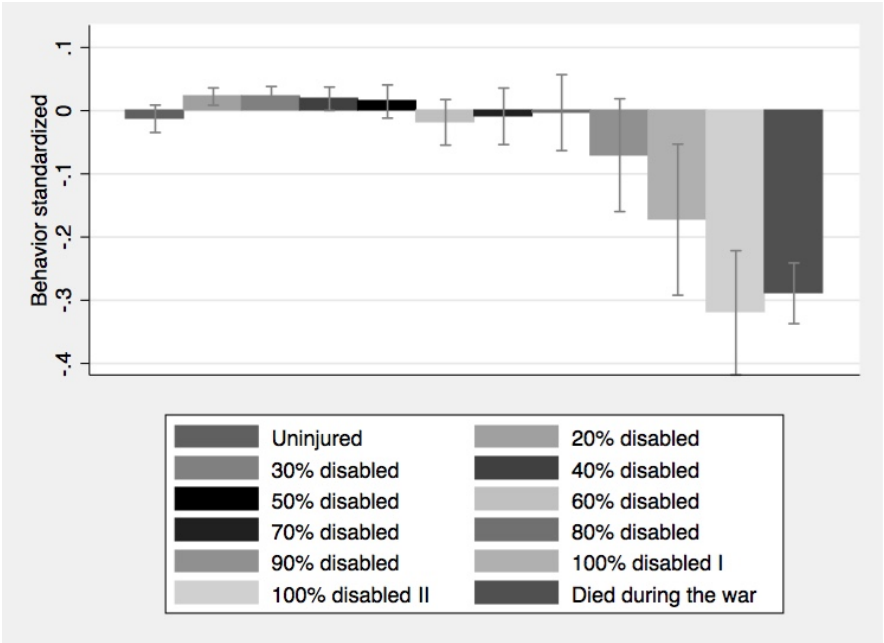


Figure 1.2: School behavior by mortality and disability status



Chapter 2

What's in a Name in a War

Dejan Kovač and Stepan Jurajda[1]

Abstract

We implement a novel empirical strategy for identifying and studying a strong form of nationalism—the willingness to fight and die in a war for national independence—using name choices corresponding to previous war leaders. Based on data on almost half a million soldiers, we first show that having been given a first name that is synonymous with the leader(s) of the Croatian state during World War II predicts volunteering for service in the 1991-1995 Croatian war of independence and dying during the conflict. Next, we use the universe of Croatian birth certificates and the information about nationalism conveyed by first names to suggests that in ex-Yugoslav Croatia, nationalism was on a continuous rise starting in the 1970s, consistent with Fearon and Laitin (2003), and that its rise was curbed in areas where concentration camps were located during WWII. We also link the nationalist values we proxy using first name choices to right-wing voting behavior in 2015, 20 years after the war. Our evidence on intergenerational transmission of nationalism is consistent with the trade-off between within-family and society-wide transmission channels of cultural values proposed by Bisin and Verdier (2001) and it suggests a mechanism that sustains elevated parochial altruism across generations.

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2.1 Introduction

Nationalism has been a principle driver of wars and of political violence throughout modern history, particularly in the Balkans (Petersen, 2002; Biondich, 2011). Wars, in turn, have dramatic, long-lasting effects on a country's political, cultural, and ethnic identity, according to a recent body of work based in large part on voting behavior (Mayhew, 2004; Bellows and Miguel, 2009; Anderlini et al., 2010; Petersen, 2012; Fontana et al., 2016, Ochsner and Roesel, 2016). Experiencing war also strengthens in-group cooperation and altruism towards members of one's group (Choi and Bowles, 2007; Voors, et al., 2012; Bauer et al., 2016), i.e., preferences supportive of nationalism. A key unanswered question in the literature is to what extent the persistence of the effects that wars have on political values and in-group cooperative behavior is underpinned by intergenerational transmission of values within families. It has been suggested that intergenerational transmission of political and cultural values affects economic development, political outcomes, and inter-group and inter-national tensions (e.g., Bisin and Verdier, 2000; Guiso et al., 2006; Montgomery, 2010; Voigtländer and Voth, 2015), but the study of the effects wars have on political attitudes across generations is curbed by lack of data.[2] There are now surveys offering direct measures of political values and attitudes across recent generations (Albanese et al., 2014; Dohmen et al., 2012; Dhar et al., 2016; Jennings, et al., 2009; Ojedaa and Hatemi, 2015), but such advanced surveys are not available to study important historical events including wars, which is why research on the persistence of political and cultural values often relies on indirect measures of values and attitudes (e.g., Voigtländer and Voth, 2013; Fouka and Voth, 2013).[3]

In this paper we implement a novel empirical strategy for identifying and studying nationalism and its intergenerational transmission based on child name choices corresponding to war leaders.[4] Such indirect approach is particularly applicable in countries that feature a sharply divided ethnic mix and in settings where leaders' names are notoriously associated with their political beliefs. Given the widespread availability of birth certificate records, the approach naturally lends itself to the study of intergenerational transmission and is available in many historical settings.

[2]Most of the work on intergenerational links focuses on easily measured traits such as education (Currie and Moretti, 2003), welfare dependence (Dahl et al., 2014), and occupational choice (Dal Bó et al., 2009).

[3]Lupu and Peisakhin (2017) study the legacy of political violence among Crimean Tatars using the first available survey of inter-generational transmission of ethnic parochialism.

[4]Throughout the paper, we could have alternatively used the term patriotism for the values we study.

Importantly, our approach allows us to measure a strong form of nationalism—the willingness to fight and die in a war for national independence—that is in principle difficult to elicit in surveys. This trait is of substantive interest to nations dealing with free-riding in active war service.[5] By linking parents' memory of a past war to the participation of their sons in a current war, we provide evidence on how countries solve the collective action problem of securing sufficient number of volunteers for service in war. While the literature on nationalism highlights the self-reinforcing relationship between nationalism and conflict, we document the positive welfare contribution that nationalism can have within groups engaged in war towards the provision of the most costly public good a group can ask for—one's life.

We apply our approach to the study of 20th-century Croatian nationalism. Specifically, we explore the links between WWII in Croatia and the War of Independence (hereafter WoI) fought between Croatia and Serbia during 1991-1995, one of Europe's deadliest conflicts since World War II. We study volunteering for and dying in the WoI and the intergenerational transmission of values associated with this behavior. In a subset of our analysis, we also link the values we measure during 1991-1995 to parenting styles and to post-war voting behavior.

As of the start of the WoI in 1991, Croatia had no regular army and so massive volunteering was critical to its defense, especially before the draft process began.[6] We show that men who share their first name with the notorious leader(s) of the WWII Croatian state were significantly more likely to volunteer for war service in the Croatian army and that they were more likely to die during the full-scale armed conflict between Croats and Serbs. The analysis, based on the complete registry of almost half a million Croatian veterans of the WoI implies that having a 'nationalist' first name predicts costly patriotic behavior in war, presumably due to values transmitted from parents.

The use of the names corresponding to WWII leaders ebbed in Croatia after WWII, but these names gained in popularity starting in the 1970s. The rise in the popularity of nationalist names thus foreshadows the WoI. Using the universe of over 3 million Croatian male birth certificates from 1930 to 2000, we show that this rise is curbed around the locations of WWII concentration camps, i.e., places where atrocities were committed by the Croatian WWII state. We also show that the use of the name corresponding to

[5]The free-riding issue has been studied in the context of civil wars (e.g., Humphreys and Weinstein, 2008).

[6]At its peak, the volunteer force in active duty corresponded to about one sixth of the Croatian male population aged 25 to 54.

the Croatian WWII leader—Ante—for newborns reaches WWII levels in locations that experienced high combat exposure during the Croatian-Serbian 1991-1995 war and spikes dramatically in locations affected by extended enemy siege or occupation after the siege (occupation) ended in 1995.

We thus demonstrate that first names corresponding to previous war leaders can contain an informative signal about one's nationalism, a signal that correlates with extreme war experiences and that predicts the willingness to serve in a war for national independence. Armed with our proxy measure, we next inquire about the nature of the intergenerational transmission of nationalism. We focus on name choices made during the WoI when the use of nationalist names peaked and test for the presence of a trade-off between within-family and society-wide transmission channels of traits across generations suggested by Bisin and Verdier (2001). We find evidence consistent with the presence of purposeful cultural transmission of nationalism as suggested by their model. In this regard, our findings are similar to those of Campante and Yanagizawa-Drott (2015), who uncover intergenerational transmission of war service, but not of military service in peacetime, in US families.

This evidence is important for the literature studying the choices made by parents on behalf of their children and their ethnic or national groups. In the models of intergenerational transmission of preferences proposed by Akerloff and Kranton (2000) and Bisin and Verdier (2001), parents see their children's well-being as depending directly on their identity (group membership, in our case nationality) and so they transmit group-relevant values. Algan et al. (2013) suggest that parents are conscious of the costs associated with name choices. In their case, French Arabic parents consider the labor market costs of name choices corresponding to their ethnic identity. In our case, Croatian parents transmit values related to their living memory of war that are of critical importance to their group (nation) in the next war, even if such values can be extremely costly to their children. This is consistent with the coevolution of wars with elevated *parochial altruism,* defined as increased altruism towards members of one's group in response to inter-group conflicts, proposed in the literature on human behavior and evolutionary biology (e.g., Choi and Bowles, 2007). The body of empirical work summarized in Bauer et al. (2016) supports the notion that the adaptation of preferences towards adherence to social norms increases the success of groups during conflicts due to solving collective action problems. The literature studies the in-group- and out-group-behavioral response to war experiences, but it has yet to consider the transmission of in-group pro-social or

out-group potentially hostile preferences across generations. War experiences can lead one to become more risk-seeking and cooperative within one's group (as documented by, e.g., Voors, et al., 2012), and they can also lead one to inculcate such values in one's children. Our evidence on intergenerational transmission of values related to war behavior thus links the parochial altruism literature with the study of inter-generational transmission of preferences.

A priori, it is not clear how strongly the values we measure mix nationalism (patriotism) with right-wing political values (Hedl, 2005). We therefore additionally ask about the association of the nationalist signal in names with right-wing voting patterns in the 2015 Croatian parliamentary elections, twenty years after the war, and find a significant link. Municipalities with a higher share of Antes among newborns allocate a higher share of their votes to right-wing parties. Antes are over-represented among candidates of right-wing parties and receive a disproportionately high share of preferential votes when they run on right-wing party slates in electoral districts directly affected by the WoI. These results are in line with the hypothesis that the effects wars have on political behavior is long-lived (e.g., Fontana et al., 2016). That name choices predict both war behavior and right-wing voting ties our main findings to the recent evidence of within-family transmission of right-wing attitudes over generations (Avdeenko and Siedler, 2017; Ochsner and Roesel, 2016). The signal contained in name choices allows us to simultaneously study war service, regional patterns of political values, their intergenerational transmission, parenting styles, and voting behavior. The measurement approach we implement resembles that of the research on socioeconomic mobility, which deals with the lack of historical data by utilizing the fact that names provide a signal about one's socioeconomic standing (Clark, 2014; Güell et al., 2015; Olivetti and Paserman, 2015). Our evidence on political values adds an important dimension to the literature exploring the information content of child name choices, which already recognizes that the choice of first names can be an expression of cultural, ethnic, or religious identity (Lieberson, 2000; Fryer and Levitt, 2004; Haan, 2005; Aura and Hess, 2010; Mateos, 2014; Cook et al., 2015; Abramitzky et al., 2016; Fouka, 2016).

2.2 The War of Independence

In June 1991, Croatia declared its independence from the Yugoslav federation. The Croatian War of Independence, referred to as the Homeland War in Croatia, was waged from

the summer of 1991 to the end of 1995 between the Croatian army and the Serb-controlled Yugoslav People's Army (JNA) and local Serb forces opposing secession. During 1991 and 1992, the JNA conducted combat operations in Croatia and helped to establish the Republic of Serbian Krajina, covering the quarter of Croatian territory mostly corresponding to areas with high shares of ethnic Serbs. After the ceasefire of January 1992, the front lines were entrenched until 1995, when Croatia launched two offensives known as Operation Flash and Operation Storm, which effectively ended the war in its favor. Approximately 20,000 people were killed in the war, most of them civilians.[7]

Our analysis of behavior during the war is based on the complete registry of military personnel of the Croatian Ministry of Veterans, which includes information on 480,092 male soldiers serving during the war,[8] 97% of whom were involved in combat operations. During the roughly eight million man-months these soldiers spent in active duty during the war, 6,060 of them (1.3%) were killed in action (KIA)—a category which in our case includes deaths caused by wounds sustained in action as well as deaths in captivity.[9] As of the start of the war, Croatia had no regular army since the JNA was under Serbian control. The Croatian army was thus initially formed from volunteers and grew in size significantly in late 1991, when a draft process began based on the registry of Croatians who had served earlier in the JNA.[10] Figure 1 shows the evolution of the size of the Croatian army and of its volunteer/draftee composition.[11] In total, there were 162,267 male volunteers serving during the war and 317,825 draftees.

Figure 2 shows the evolution of monthly death rates—the ratio of soldiers dying in a given month to the number of active-duty soldiers as of the start of the month—separately for volunteers and draftees. The war was at its deadliest in the fall of 1991 (55% of KIA deaths occurred during the first six months of the war) and in August 1995. Soldiers drafted during 1991 faced particularly high risk of death. This could be due to selection. First, volunteers may be relatively more skilled soldiers, especially during the first few

[7] Although the conflict began as a war for independence, the violence in Yugoslav wars often involved attempts to create ethnically "pure" states and was waged primarily against civilians (Naimark, 2001). Tabeau and Bijak (2005) illustrate the difficulty of forming estimates of total casulties in the Yugoslav wars.

[8] We exclude from the analysis the 5% of female soldiers who all served in non-combat support jobs.

[9] In total, 9,378 soldiers died during the war, 7,747 in active duty. For 7,346 of these, we observe the cause of death: 77% were killed in action. We assume the remaining 401 soldiers were also killed in action.

[10] Exemptions from service were possible on health grounds, but were seldom granted (UN, 1995).

[11] The status of a volunteer is governed by the Croatian Act of Homeland War Veterans; it affects welfare support available to veterans and their families.

months of the war.[12] Second, volunteers joined the army earlier and served longer; at a given point in time, they are thus more likely to serve in higher ranks than draftees. Unfortunately, our data does not include rank and this complicates the analysis of KIA death determinants as rank is generally negatively correlated with the chances of dying in a war.

Importantly for our analysis, we observe soldier's place of birth. As of 2015, Croatia, a country of over 4 million, consisted of 21 administrative districts ('županije'), 556 cities and municipalities ('općine i gradovi'), and 6,750 settlements ('naselje'). Most of the fighting during 1991-1995 occurred in the 10 districts located along Croatia's eastern border. Correspondingly, the settlements of Croatia were affected by the war in a most uneven fashion. Part of our analysis is based on merging the veterans registry with settlement-level data from the 1991 Croatian census based on the soldiers' place of birth. In particular, a set of 177 settlements was directly exposed to extensive combat or was under extended occupation by the JNA during the war. Hereafter we refer to these locations as the 'siege settlements'.[13] As of the start of hostilities, Croatia included a large Serbian minority. Based on the 1991 Census, 78% of Croatia's inhabitants were Croats and 12% were Serbs. We do not observe soldiers' nationality, but infer nationality from names, as detailed in the next section.

2.3 Nationalist Names

Our first task is to classify the first (male) names appearing in the veteran register. We are chiefly concerned with studying names linked to the Croatian WWII leadership. But first, we measure the nationality content of first names in order to identify ethnic Croats among Croatian army soldiers (who are all citizens of Croatia). We do this in order to construct a useful benchmark for studying correlates of the Croatian nationalist names in the multi-national mix of the Croatian army. Our first goal is thus to exclude Serbian and Muslim veterans from the analysis of nationalist names. We can do so because in the countries of former Yugoslavia, first names carry a strong nationality signal thanks to the close link between religion and nationality. As in most European countries, newborns' names are chosen from a list of first names corresponding to an annual calendar of name

[12]For example, Ante Gotovina, who became a leading general during the 1995 Operation Storm, already had combat experience in 1991 when he volunteered for the Croatian army.

[13]This set is defined in the Croatian Act on Areas of Special State Concern.

days (which are celebrated similarly to birthdays). Croats are predominantly Catholic so that parents rely on a Catholic-saint name calendar while Serbs are predominantly Orthodox and use an Orthodox name calendar. Appendix 2.10.1 provides the details of this classification. We identify 74% percent of veterans as Croats, which is broadly in line with the fact that, as of 1991, 78% of Croatia's inhabitants were ethnic Croats. In most of our analysis, we thus focus on the 354,773 Croatian army veterans who have Croatian first names. In this Croatian sub-population of veterans, the basic features of the veteran registry remain intact including the share of volunteers (at 35% in the Croatian sub-population, up from 33% in the universe of veterans) and the risks of KIA deaths (at 1.28%, up from 1.26%).

What names correspond to Croatian WWII leaders? During WWII Croatia was ruled by the Ustaše movement, which blended fascism, Roman Catholicism, and Croatian nationalism. The military wing of the movement became the army of the Croatian fascist state and its Ustaše government enacted race laws patterned after those of the Third Reich. It established concentration camps in Croatia and members of the movement murdered hundreds of thousands of primarily Serbs, Jews and Roma. The movement was founded and led (until its dissolution in 1945) by Ante Pavelić, who also acted as dictator during WWII. We thus consider Ante to be a potentially nationalist name. Ante is a Croatian form of Anthony and there are distinct alternative versions of Anthony in use in Croatia (Antun, Anto).[14] In addition, we code an indicator corresponding to the first names (other than Ante) of the politicians and generals who received the most important Nazi decoration during WWII—the Knighthood of the Independent State of Croatia. Our purpose is to form a sufficiently wide group of names related to the WWII Croatian state so as to support (or reject) the interpretation that we attach to the primary nationalist name Ante. But this approach leads us to include in the 'Other nationalist name' indicator also names that have strong non-Ustaše nationalist connotations. Appendix 2.10.1 discusses the nationalist-name classification in detail.

8,001 Antes served in the Croatian army during the 1991-1995 war, forming a group of 1.7% of all veterans and 2.3% of the Croatian-name sub-population of veterans. In addition, 25.9% of Croatian-name veterans (21.4% of all veterans) carry other nationalist names. These shares suggest over-representation of Antes among those serving in the war, given the general popularity of these names in Croatia as implied by our secondary

[14]The name Ante also refers to Ante Starčević, the 19th century Croatian politician and writer who is considered to be one of the founders of Croatian nationalism.

data source—the population of Croatian birth certificates from 1930 to 2000, which covers 3,002,491 live male births. As Figure 3 attests, the share of newborn boys named Ante and the corresponding share of other nationalist names on Croatian birth cohorts follow a similar pattern. These names, Ante in particular, experienced an increase in popularity during both WWII and the WoI. Following WWII, their share in birth cohorts declines by over a half,[15] then rebounds during the 1970s and 1980s, which may suggest Croatian nationalism was increasing long before the breakup of Yugoslavia.[16] This pattern is consistent with the use of these names corresponding to nationalist sentiments. We test this hypothesis in the next section.

2.4 Names and Behavior in War

2.4.1 Volunteering

Our first question is whether there are nationalist-name patterns in the volunteering behavior of Croat males in 1991 and 1992. The goal is to estimate such patterns without data on non-active reservists, i.e. without a direct sample of the population at risk of volunteering. As documented in Figure 1, volunteering choices were largely made before the draft process started in earnest. Given that the draft was name-blind,[17] the draftees names are not selectively picked from the reservist population after volunteering choices were made, so that our data on volunteers and draftees represent a choice-based sample. Because unobservables affecting the choice to volunteer directly affect the sampling probability, which is thus not independent of the dependent variable conditional on the explanatory variables, consistency requires that we weight the criterion function to be minimized by the inverse probability of selection (Wooldridge, 1999), which in our case corresponds to 1 for volunteers and to the cohort-specific draft rates for draftees.[18]

The first column of Table A1 shows the estimated coefficients from a linear probability model of the volunteering decision controlling for the step function in age, place-of-birth

[15]Similar drops in popularity of WWII leader names were experienced in other countries. Benito now represents under 0.02% of newborn boys in Italy; Adolf vanished from German birth statistics by 1950.

[16]It is plausible that Croatian nationalism was tacit until it became activated during the 'Croatian Spring' movement of the early 1970s, which called for more rights for Croatia within Yugoslavia, and which was suppressed by force (Motyl, 2001). We return to the evolution of nationalism in Section 2.5.

[17]We confirm that the draft was name-blind by combining the birth certificate data with the veteran data: being named Ante or having another Ustaše name does not predict the name-cohort-specific draft rate; the effect is close to zero and precisely estimated.

[18]The cohort-specific draft rates are highest, at 0.35, for the youngest cohorts born after 1973, and they gradually decline to 0.10 for the 1950 cohort.

controls, and for the two name indicators of interest. (As motivated in the previous section, the base group consists of soldiers with Croatian names.) The regression implies that Antes are about 6 percentage points more likely to volunteer for service in the WoI than other Croat males. The difference in volunteering likelihood is somewhat smaller for those with other nationalist names, but both differences are statistically significant.[19] In column (2), we ask to what extent volunteering patterns may correspond to geographical differences in the prevalence of nationalist names correlated with the pattern of active military operations during the war. To this effect, the regression in column (2) additionally controls for a set of district fixed effects and also for an indicator of the place of a soldier's birth being under siege (a property defined in the previous section). Further, we ask to what extent the effects estimated in column (1) correspond to having a generally popular name. If a name that is popular in Croatia is identified as particularly 'Croatian', then popular names could be nationalistic without any historical reference. Hence, we also condition on an indicator for popular first names; specifically, for the top-10 most popular Croatian names (other than Ante, but including the 'nationalist' Ivan and Josip) from the 2001 Census. These additional controls lower the coefficients for the Ante and 'Other nationalist name' indicators to about 4 (2) percentage points, respectively. Both coefficients remain highly statistically significant, but the 'Other nationalist name' coefficient, which is now chiefly based on names outside of the top-10 list, is statistically indistinguishable from the top-10-name coefficient.

To shed more light on the importance of having a popular vs. nationalist name, we additionally estimated the specification from column (2) on the subset of soldiers with names from the top-10 Croatian name list. When compared to all other top-10 names, Antes were over 2 percentage points more likely to volunteer (and this effect was statistically significant at the 5% level). Comparing the Ante coefficient to the coefficients for other specific popular names from the top-10 list implied that the volunteering share of Antes (conditional on location of birth and age) is statistically significantly larger (at the 10% level) than that of all other popular names, with the exception of Ivan, which is included in the 'Nationalist name' indicator. Hence, Ante and Ivan are two popular names that both have historical nationalist connotations and that both strongly predict

[19] An important concern is that nationalist name choices may be correlated with rural status. All specifications in Table A1 therefore control for a set of characteristics of soldiers' places of birth measured at the detailed level of almost seven thousand settlements as of 1991. The upper panel of Appendix Table 2.5 additionally shows coefficients corresponding to column (1) of Table A1 estimated for subsets of birthplaces based on their size and share of agricultural employment. Both coefficients are similar in size and statistically significant in all subsets.

volunteering, in comparison to all other Croatian names as well as in comparison to all popular Croatian names.

Next, we perform a number of robustness checks.[20] In column (3), we replicate the specification from column (2) after excluding the large unit of Civil Defense, which has a high share of volunteers, but low risks of KIA death. Doing so does not affect the key estimated coefficients. In column (4) we include in the estimation all veterans of the WoI, not only those with Croatian names, and we additionally control for having a Serbian or a Muslim name (as defined in the previous section). This again does not have any important effect on the estimated coefficients of interest.[21] In column (5), we minimize the chances of including Croatian citizens of non-Croatian nationality in our analysis by restricting the set of soldiers with Croatian names (used in column (2)) to its subset consisting of soldiers who were born in settlements that, according to the 1991 census, had over 90% of ethnic Croats in them. The estimates in column (5) are again fully in line with those in column (2), except that the top-10-name coefficient is no longer statistically significant.

Our estimates imply that the effect of being named Ante on volunteering is quantitatively comparable to the effect on volunteering generated by one's birth place being under enemy siege and that the broader group of other nationalist names also has a significant, albeit smaller effect on volunteering. Finally, in column (6) we ask whether the effects of being Ante and of having another nationalist name differs for soldiers coming from settlements that are under enemy siege. The interaction-coefficient estimates suggest that being named Ante predicts volunteering particularly strongly in areas that were most exposed to the war for independence. It may be that the nationalist implications of being raised as an Ante are particularly strongly activated under direct threat of war. In settlements under enemy siege, Antes are over 12 percentage points more likely to volunteer than other Croats. This is a large effect considering that the overall volunteering rate was about 12 percent.

[20] In addition to robustness checks reported in this paragraph, we also estimated the specification from column (2) without the choice-based-sample weights and the estimates were not materially affected. Next, we compared the OLS coefficients reported here to probability derivatives corresponding to a Probit model. Again, the results were identical for all practical purposes. The results are available upon request.

[21] In this specification, we find that compared to the base case of having a Croatian name, having a Serbian or a Muslim name lowers volunteering probability by 4 and 9 percentage points, respectively.

2.4.2 KIA Risks

In this section, we ask whether having a nationalist name predicts being killed in action (KIA) during the WoI for soldiers involved in combat situations. We ask this question to check (refute or fortify) the interpretation that the volunteering analysis of the previous section offers: that being called Ante correlates with nationalist (patriotic) values. We face a major obstacle in the KIA analysis: the lack of soldier rank information. In any war, higher-ranked soldiers are less likely to die. The rank issue may be particularly important for volunteers who joined the army first and who may be particularly skilled soldiers. At a given point in time, volunteers are thus more likely to serve in higher ranks than draftees. Long-serving draftees are also likely to serve in higher ranks. We therefore minimize these issues by focusing on draftees and their KIA risk during 1991. Draftees during the first six months of the war are the group least likely to serve in higher ranks, and it is also the group facing by far the highest death rates (see Figure 2).

More specifically, for the purpose of the KIA analysis, we first omit soldiers who were never in combat. This excludes the entire (40-thousand-strong) Civil Defense unit of the Croatian army, and under 3% of the rest of the army. Within this subset, 1.1% of draftees and 1.6% of volunteers are KIA. Next, we omit all volunteers and also those draftees entering service after December 1991. We only consider KIA deaths occurring during 1991. As a result, we are left with 72,586 draftees with Croatian first names, a group of which 1.9% is KIA during 1991. The results are presented in Table A2, which is structured similarly to Table A1. The only difference vis-à-vis the specifications used in Table A1 is that we always condition on a set of 6 fixed effects corresponding to the month of army entry (during 1991) in order to minimize the effect of rank differences, to the extent these are correlated with the length of service, and also, more fundamentally, in order to control for the length of KIA risk exposure. The basic sets of estimates in column (1) and (2) are fully consistent with the volunteering effects estimated in the previous section.[22] Antes and, to a lesser extent also those with other nationalist names, are more likely to be killed in action during the first six months of the war, when the war was at is deadliest. Compared to the average KIA death rate for early draftees (0.019),

[22]Note that our focus on draftees and the results of the volunteering analysis imply that the Antes drafted in 1991 are likely to be less nationalistic than the average Antes in the population. Hence, the results presented here provide a lower-bound on the effect of being Ante on the chances of being killed in action. As was the case with volunteering, the Ante coefficients are all large and statistically significant when estimated on sub-samples of soldiers' places of birth based on size and share of agricultural employment (Table 2.5).

the Ante coefficient in column (2) increases KIA risks by about a half. The effect of being from a 'siege settlement' is again stronger than the Ante effect and the KIA effect of top-10 popular names is similar in magnitude to that of the 'Nationalist name' indicator, although it is not precisely estimated in column (2).

We have additionally estimated the specification from column (2) using only top-10 Croatian names, and the Ante coefficient estimated against this narrower benchmark group was again statistically significant (at the 1% level) and similarly large (at 0.0073). When compared to all other specific top-10-name coefficients, the Ante coefficient is statistically significantly larger than all but one (Mario). Hence, combining the volunteering and KIA evidence, Ante is the only name that consistently predicts behavior in the war compared to the 'placebo effects' of other popular names. As was the case with the volunteering estimates, the KIA effects are not sensitive to including non-Croatian-name soldiers (in column (3)) and to studying only soldiers from almost-all-Croatian settlements (in column (4)).[23] The Ante coefficient is smaller in column (4), but it remains highly statistically significant and one cannot reject the hypothesis that it is equal to the coefficient in column (1).

Finally, in column (6), we ask whether nationalist names predict KIA risks differently for soldiers who were born in 'siege settlements'. The effect of being named Ante does not differ between siege and non-siege settlements. Recall that Antes from 'siege settlements' were particularly likely to volunteer (see previous section) and so these highly patriotic Antes are under-represented in the draftee sample used in the KIA analysis. On the other hand, those with other nationalist names, for whom being from 'siege settlements' did not increase chances of volunteering, are more likely to be KIA when they come from these locations most affected by the war. We also obtain a puzzling negative siege interaction coefficient for the top-10 Croatian names.

Overall, the pattern of volunteering and KIA estimates is strongly consistent with the hypothesis that nationalist names and Ante in particular provide a significant signal about one's nationalistic values as manifested by volunteering in a war of national independence and dying in the war, which suggests higher risk-taking in combat. Nationalistic values (presumably inculcated by parents) linked to WWII history matter in the 1991-1995 war.

[23] We also obtain highly similar effects using the Probit model.

2.5 The Use of Nationalist Names and War Experiences

A growing literature (discussed in the Introduction) suggests that wars have dramatic and long-lasting consequences for political identity. In this section, we employ the information about nationalism conveyed by first names to explore nationalism patterns in Croatia following WWII and the WoI. While we only have an indirect proxy, it allows a unique view of the past given the absence of direct historical measures of nationalism.[24] Our specific goal is to relate the evolution of the use of nationalist names to traumatic war events. First, we ask whether the memory of the atrocities perpetrated in Ustaše-operated concentration camps during WWII has subsequently attenuated nationalistic tendencies (Macdonald, 2002).[25] Next, it has been suggested that reactivation of historical memories by current related events can change behavior dramatically (Fouka and Voth, 2013; Ochsner and Roesel, 2017). We therefore ask whether the 1991-1995 siege (during which civilians suffered greatly, see, e.g., Naimark, 2001) and the extent of combat operations (proxied by KIA regional concentration) strengthened regional nationalist attitudes during the WoI.

The analysis is based on the birth certificate data from 1930-2000 introduced in Section 2.3. We match the birth-location strings to three types of locations: (a) 21 'high-KIA locations' (proxying for exposure to combat operations), (b) 177 'siege settlements' during the WoI, and (c) 10 WWII 'concentration-camp locations'.[26] In the veteran data, KIA deaths during the 1991-1995 war occur in 216 distinct settlements; from these we denote as high-KIA locations those 21 (one tenth) with the highest share of all KIA deaths. This list includes notorious battlefront towns (e.g., Vukovar, Osijek) as well as major cities directly affected by combat operations (e.g., Dubrovnik, Zadar). Each of these three sets of locations covers a sizeable portion of the Croatian birth population.[27] Furthermore, Appendix Figures 2.8, 2.9, and 2.10 show that the three sets of locations are

[24] The view of the past, however, comes with the cost of making the strong assumption of a constant nationalistic content of a given name over time.

[25] In the Jasenovac concentration camp alone, at least 80 thousand perished during WWII, primarily Serbs, but also Jews, Roma, and anti-fascist Croats. While estimates differ and are not available for all camps, victim counts range well over 10 thousand for the Jadovno (Gospić) or the Slana (Pag) camp as well.

[26] See section 2.2 for definition of the 'siege settlements'. The major Ustaše-operated concentration-camp locations in Croatia (Jasenovac, Stara Gradiška, Jadovno near Gospić, Slana on Pag, Metajna, Sisak, Koprivnica, Jastrebarsko, Osijek, Đakovo) are taken from Kraus (1996, p. 90).

[27] 14% of births occur in high-KIA locations; 5% (6%) occur in 'siege' (concentration-camp) locations.

geographically diverse. Hence, it is plausible that differences in the evolution of the use of nationalist names across these locations are not driven by idiosyncratic location-specific factors. Appendix figure 2.8 shows that in areas where Ustaše-operated concentration camps were located during WWII, Ante never regains its WWII popularity, not even during the WoI.[28] In contrast, in Figure 2.5 we see a return to the locality-specific WWII-level popularity of Ante in places where a high share of KIA deaths occurred during the 1991-1995 war. Here, the large spike in Ante popularity during the WoI may correspond to exposure to combat operations. In both sets of locations, the use of other nationalist names evolves similarly and is not far from the national pattern.

Finally, Figure 2.6 shows the evolution of the popularity of nationalist names in locations that were under Serbian siege or occupation during the 1991-1995 war; hence, it is natural that the share of Croatian nationalist names there is low during the war. After the war, however, the shares of nationalist names increases dramatically. The share of Antes surpasses WWII levels.[29] This pattern likely corresponds in part to declining shares of the Serbian population not captured by our Serbian- and Muslim-name indicator, which limits the use of the siege locations for the analysis of intergenerational transmissions of nationalism (in the next section). Nonetheless, the spike in the prevalence of nationalist names after the WoI in these locations is suggestive of the nationalist content of these names.[30]

The descriptive analysis presented in this section is consistent with nationalist sentiments (as reflected in the use of Ante for newborns) reacting strongly to war exposure during 1991-1995 and being affected by long-lived memories of WWII atrocities, but it cannot provide strong evidence on these issues since we cannot fully control for location-specific unobservables. Values corresponding to nationalist names choices can evolve differently across various contexts. There are two specific potential issues with our interpretation of Figure 4 as suggesting that memories of WWII atrocities curb nationalism: First, while geographically dispersed, concentration-camp location choices may have been skewed towards Ustaše strongholds. If so, however, one would expect the rise of the popularity of the name Ante since the 1970s to be stronger there, not weaker. Second, it

[28] During WWII, the popularity of Ante in the concentration-camp locations was comparable to that in the rest of Croatia (shown in Figure 2.4), but it remained about one percentage point below the national level since the end of WWII.

[29] Also, both shares are statistically significantly above the Croatia-wide shares of the late 1990s.

[30] This pattern may correspond to the reactivation of past memories suggested by Fouka and Voth (2013). It is also plausible that it is related to the prominence of Ante Gotovina, a leading Croatian general.

is plausible that there is stigma attached to the name Ante in the concentration camp locations thanks to the WWII atrocities, even if nationalism is in fact not affected by these experiences. In the presence of such stigma, only those with very high levels of nationalism would choose the name Ante for their sons, implying that the name Ante would have a stronger predictive power for our volunteering and KIA outcomes in the concentration-camp locations. In fact, the Ante coefficients corresponding to the soldiers born in concentration camp locations are smaller, even if not statistically significantly so, compared to the coefficients reported in columns (1) of Tables A1 and A2.

2.6 Intergenerational Transmission of Nationalism

There is much work in economics, evolutionary anthropology, sociology, political science, and social psychology studying how preferences, beliefs, and norms are transmitted through generations, and in particular the role of social interactions (Bisin and Verdier, 2010). Whether direct vertical cultural transmission of traits within families acts as a substitute or complement to the oblique transmission from the society has implications for the dynamics of cultural traits in the society. This literature on cultural (as opposed to evolutionary) transmission has studied various elements of preferences including the discount factor, the importance of education, corruption tendencies, and the (strongly persistent) relevance of ethnic and religious values. We extend this research by analyzing the intergenerational transmission of nationalist values, which in our context predict the provision of the most costly public good a group can ask for—one's life.

The results provided above suggest that the experience of the 1991-1995 war, when the use of nationalist names was peaking in Croatia, offers an important case to study the intergenerational transmission of nationalism. We therefore focus our analysis on nationalist-name transmission during the independence war, i.e., for boys born during 1991 to 1995. This is also the period during which we established the nationalist signal (information content) of nationalist names in Section 2.4 for adult male cohorts of potential fathers. To assess the extent to which nationalism spreads through intergenerational transmission, we again rely on the birth certificate data and study first name choices for sons depending on whether their fathers have a nationalist name.

The Bisin and Verdier (2001) model allows values to be transmitted either directly from parents to offspring or 'obliquely' by offspring interacting with society outside the family. It predicts that there is substitution between intergenerational transmission of

cultural or political traits and the oblique transmission from society at large. In our context, this suggests that nationalist fathers may invest less in inculcating nationalist values (may be less likely to transmit a nationalist name) if there is a strong chance that those values will be passed on by a local society where they are widespread. We thus test whether the Ante-Ante (nationalist-nationalist) transmission is weaker for fathers with nationalist names in locations where the prevalence of nationalist names is stronger.[31] An alternative, simpler, explanation for nationalist-name geographic patterns is that name choices of all parents (nationalist or not) co-move with regional trends of name popularity driven by cultural or political factors.

The first two columns of Table A3 show regression coefficients from specifications explaining an indicator for a newborn son being given the name Ante; the remaining columns correspond to regressions explaining the choice of any nationalist name (including Ante).[32] These regressions are estimated separately for fathers with nationalist names (including Ante) and those with other Croatian names. To test for the presence of substitution between within-family transmission and that provided by the society, we condition on the pre-war share of nationalist names at the municipality level.[33] Similar to the analysis in Section 2.4, we also condition on several municipality characteristics. The pre-war shares are measured in municipalities with births in the five-year period prior to the 1991-1995 war. We follow up on the analysis provided in the previous section and also condition on binary indicators for the concentration-camp and high-KIA locations. The average share of Antes on boys born during the pre-war period is 1.4% and the average share is lower, at 0.5%, in the concentration camp locations and similar to the national average, at 1.2%, in the high-KIA locations.[34] The regression coefficients for the pre-war shares test the prediction of the 'oblique' transmission channel from the Bisin and Verdier (2001) model applying to nationalist fathers vs. the simpler alternative of area-specific name-popularity trends affecting all fathers. In line with the model's prediction, we find that fathers named Ante are less likely to transmit their name to their sons during a war of national independence when the share of Antes is generally high in their municipality.

[31] We are not primarily interested in comparing the Ante-Ante rate to other same-name transmission rates; rather, we study geographic differences in the nationalist-nationalist and non-nationalist-nationalist rates.

[32] We include Ante in the 'Nationalist name' indicator to lower the number of transition types.

[33] We are able to match most of the birth records to one of the Croatian municipalities. The match rate is over 90% for cohorts born after 1990.

[34] There is little difference across the groups of locations in terms of the pre-war shares of all nationalist names: the averages are all between 19% and 21%. However, within each group of locations, the share ranges from about 10% to about 40%.

For fathers not named Ante, however, we find that the share of Antes in one's area is positively associated with the share of Antes among newborns. The estimates in column (1) also imply that the use of nationalist names is lower by Ante fathers during the 1991-1995 war in the concentration-camp locations relative to the rest of Croatia. Based on the name whose use is most sensitive to the wars our analysis covers, we find evidence consistent with nationalist fathers (named Ante) being less likely to transmit nationalist names when they reside in an area (a) affected by long-lived memory of WWII atrocities related to the history of nationalism,[35] and (b) where nationalism is prevalent in the regional society at large. This evidence is consistent with nationalist fathers purposefully reflecting the transmission trade-off between family and society channels captured by the Bisin and Verdier (2001) model.[36] It may be that Ante fathers frequently choose the name Ante for their sons born outside of the highly nationalist 1991-1995 period.[37]

However, for fathers who are less nationalist as implied by our name proxy, we find (in column (2)) that they use the name Ante in tandem with the overall popularity of the name in their region and that they do not behave differently depending on the historical experience of their region. The results in column (3) and (4), which study the broad group of nationalist names (including Ante), are consistent with most of these fathers not recognizing the family vs. society (oblique) transmission trade-off and following the general area-specific name-popularity trends when choosing their sons' names.[38] The three positive coefficients corresponding to pre-war shares of nationalist names are similar in magnitude; under our interpretation of nationalist name choices, they imply that during the war, i.e. during a spike in nationalism, the regional structure of nationalism reinforced itself.[39]

[35]See Iwanowsky and Madestam (2017) for a similar finding based on the Khmer Rouge political violence.

[36]This interpretation assumes that Ante fathers in a high-Ante-share location are equally nationalistic as Ante fathers in a low Ante-share-location.

[37]With information on first names of fathers and sons alone we cannot link birth certificates by father identity and so we do not know whether Ante fathers are more likely to use the name Ante for their first-born sons or not. The share of boys born to fathers named Ante is similar during the pre-war five-year period and the 1991-1995 war period.

[38]These results are robust to including names that are not on the (Croatian) Catholic calendar. We also interacted the two location types with the pre-war municipality shares of nationalist names, but none of the interactions reached conventional levels of statistical significance in any of the specifications.

[39]An important potential issue with the intergenerational analysis is that we do not control for socio-economic characteristics of families. However, the estimated intergenerational transmission coefficients are not materially affected by controlling for municipality characteristics or by conditionin on a set of 21 district fixed effects, suggesting that the results are not primarily reflecting urban-rural or war-exposure patterns.

2.6.1 Supplementary Analyses

Our preceding analysis of intergenerational transmission of nationalism was conducted in absence of direct evidence on parenting choices of fathers with nationalist names and those of other fathers. The purpose of this section is to provide initial indirect evidence on parenting strategies. Specifically, we ask whether secondary-school in-class behavior of sons born during 1991-1995 depends on whether their fathers have a nationalist name. In-class behavior (i.e., well-behaved vs. unruly) is plausibly related to the degree to which fathers choose an authoritative parenting style, which, in turn, is plausibly related to nationalism.[40] We observe 2008-2012 grades corresponding to high-school in-class behavior for the population of 5,625 sons born during 1991-1995 to veterans of the war for Croatian independence and we study the average of these grades over the 5-year period.[41] The regression we estimate controls for a step function in fathers' years of age and is based on the subset of veterans with Croatian first names (as in Section 2.4); this limits the analysis to 4,243 sons. Other than fathers' age, the regression also controls for fathers' place-of-birth characteristics used in Section 2.4, namely size, share of employment in agriculture, and share living abroad. Sons of Ante fathers are statistically significantly less likely (at the 5% level) to have behavioral issues reflected in grades while we detect no (economically or statistically) significant effect of other nationalist names.[42] The 'Ante' effect on behavior grades corresponds to 5% of the standard deviation in behavior grades. While this evidence is certainly limited, it is consistent with Ante fathers choosing more authoritative parenting strategies, which is plausible for strongly nationalist fathers.

Finally, we complement our main analysis of intergenerational transmission by asking whether veterans of the 1991-1995 war who experienced extreme carnage in their military units during the war are more likely to give their sons nationalist names. This sheds light on the effect of close exposure to violence of war on nationalism. For a sub-set of the veterans who were seriously injured or killed in the war, we observe the names of their children. More specifically, we observe the names and birth dates of children of the 23,354 veterans who collected veteran benefits linked to their injury during the war or who died

[40] See Campante and Yanagizawa-Drott (2015) for a similar approach.

[41] We omit from the analysis of parenting styles sons of fathers who died or were severely injured during the war as such traumatic experience is likely to have a first-order effect on child outcomes. See Kovac (2017) for an exploration of this separate question. Kovac (2017) also describes the school data in more detail. The war-service injury-type information comes from the veteran database we employ in Section 2.4.

[42] The 'Ante' and 'Other nationalist name' coefficients (standard errors) are -0.0284 (0.0141) and -0.0093 (0.0194), respectively.

in the war and whose families claimed the benefits.[43] This sub-sample of veterans, which is selected on having been at least partially disabled during the war, also allows us to ask whether veteran father-son name transitions align qualitatively with our main findings.

The answer is that they do. First, we ask about the effects of soldiers' exposure to carnage measured using the maximum monthly share of their unit that was killed in the war. For fathers who did not die during the war and who had sons born after their war service, the higher the exposure to carnage in their unit, the lower the probability of transmitting both Ante and the other nationalist names to their sons.[44] For volunteers, a one standard deviation increase of the unit death rate measure translates to a half a percentage point reduction in the probability of calling one's name Ante after the war.[45]

Next, we find that, conditional on standard place-of-birth controls, volunteers named Ante who have at least one son born before the war are 4.5 percentage points (statistically significantly) more likely to have named (one of) their son(s) born before the war Ante, but there is no such relationship present for the draftees. This is consistent with volunteer (but not draftee) Ante fathers considering their name as an expression (symbol) of their nationalist beliefs. We obtain similar results for the transmission of any nationalist name. These results are tentative due to the selected nature of the sample. Future research could employ our approach for identifying political values and the intergenerational transmission thereof for random samples of veterans or civilians differentially exposed to violent conflicts.

2.7 Voting Behavior

How strongly do the nationalist (patriotic) values we proxy using name choices overlap with right-wing political values? To answer this question, in this section we examine the association of the nationalist signal in names with right-wing voting patterns in the 2015 Croatian parliamentary elections. We focus on the 2015 elections for two reasons.[46] First, this is the most recent regular parliamentary contest in Croatia, one that occurred twenty

[43] See Kovač (2017) for more details on this data.

[44] These results are presented in the Appendix Table 2.6. The regressions, which are are again based on the subset of veterans with Croatian first names (as in Section 2.4), control for a step function in fathers' years of age and for the standrd set of characteristics of fathers' places of birth.

[45] These effects are consistent with those Iwanowsky and Madestam (2017) uncover in their study of the effects of Khmer Rouge political violence on political values of survivors.

[46] As Yugoslavia did not run free multi-party elections, we are not able to study the effects of WWII events on post-WWII voting behavior in Croatia.

years after the WoI. A growing literature (e.g., Fontana, et al., 2016) suggests that wars have long-lived effects on countries' political identity. Within this line of work, Glaurdić and Vuković (2016) study post-1995 voting patterns in Croatia and uncover a stable electoral advantage of the party that led the country during the War of Independence—the Croatian Democratic Union (CDU)—in areas more heavily affected by the war. We ask a related question within our investigation of the nationalist signal of names corresponding to war leaders, namely, whether voting shares of right-wing parties twenty years after the war correlate across municipalities with shares of nationalist names (as defined in our main analysis) among newborns. In short, are regional preferences expressed in name choices correlated (conditional on municipality controls) with right-wing voting behavior?

Second, the 2015 elections were the first in Croatia that made it possible for voters to cast preferential votes in support of individual candidates as opposed to voting only on the entire slate of candidates of a given party. This allows us to ask two additional questions: Are nationalist names over-represented among candidates on the slates of right-wing parties? And do nationalist names receive a disproportionately high share of preferential votes (within slates) when they appear on right-wing slates? If Antes are not only more patriotic during wars, but also more right-wing oriented during peacetime, one would expect them to be over-represented on the slates of right-wing parties. Similarly, if right-leaning voters expect (based on the name signal) or know (based on direct knowledge of candidates) Antes to be strong representatives of right-wing values, they will allocate them with a higher share of preferential votes on the slates of right-wing parties.

The 2015 elections were won by the centre-right CDU and its coalition. We define a 'Right-wing party' indicator to correspond to the six parties that were to the right of the CDU; this set, which includes far-right parties, obtained 4% of the total vote in 2015.[47] We observe party-specific vote shares across all 556 Croatian cities and municipalities. In the first part of our analysis, we merge this information with place-of-birth-specific shares of Antes and of other nationalist names (defined in Section 2.3). Not all municipalities have births. The resulting sample, which combines information on the nationalist-name shares among newborn boys with the 2015 vote share of right-wing parties covers 401 cities and municipalities.[48] When regressing the location-specific vote share of the right-wing parties

[47]In the absence of an authoritative study on the right-wing spectrum of Croatian politics, we rely on the Wikipedia entry for the 2015 Croatian elections, which classifies the following parties as right-wing or far-right: the Democratic Union of National Renewal, the Croatian Conservative Party, the Family Party, the Croatian Democratic Alliance of Slavonia and Baranja, In the Name of the Family – Project Homeland, Croatian Dawn – Party of the People.

[48]We report results based on the share of nationalist names among boys born during 1970-2000, which

on the share of Antes among newborns, we obtain a coefficient of 0.09, which is significant at the 5% level (based on robust standard errors). The coefficient estimate corresponding to other nationalist names is a precisely estimated zero. The regression controls for municipality share of agricultural employment and average years of education, both from 2000, and for an indicator of a given municipality having been heavily affected by the WoI.[49] Increasing the share of Antes among newborns by five percentage points, which corresponds to a one standard deviation increase, is thus associated with the municipality vote share of right-wing parties being about a half of a percentage point higher (relative to the mean of 4%).

Next, we turn to the analysis of candidate names and of preferential votes. Parties can nominate slates of candidates for each of the ten main Croatian electoral districts (no candidate can appear on multiple slates). In the 2015 parliamentary elections, these slates included 2,170 distinct candidates, but our analysis is based only on the 1,216 male candidates, who correspond to 155 district-party-specific slates. Our first finding is that, compared to slates of other parties, slates of right-wing parties exhibit a 50% higher share of both Ante candidates and of candidates with other nationalist names.[50] To study preferential voting behavior, we focus on the share of preferential votes received by a given candidate on all preferential votes received by his (district-party-specific) slate. The analysis thus implicitly conditions on all party-district-specific factors determining voting preferences corresponding to a given slate as well as on the average propensity to use preferential votes within slates. Regressing the candidates' preferential-vote share on our two nationalist name indicators results in two positive coefficients shown in column (1) of Table A4. Both coefficient estimates are sizeable given that the 25/75 percentile range of candidates' shares on preferential votes received by their slate is 0.02/0.08. When we interact the two name indicators with the right-wing dummy, the Ante interaction is large and together with the Ante coefficient it is jointly statistically significant at the 5% level. The other interaction coefficient is close to zero.[51] In columns (3) and (4), we re-estimate specifications from columns (1) and (2) for the six electoral districts adjacent

allows us to maximize municipality coverage, but we obtain nearly identical estimates when relying on the corresponding shares from 1995-2000 from municipalities with births in that period.

[49] Unlike the siege indicator used in our main analysis, which is based on settlements defined as of 1991, this indicator, which is taken from Glaurdić and Vuković (2016), is coded at the level of municipalities defined as of 2000. See Section 2.2 for definitions of Croatian geographic units.

[50] This difference is statistically significant for other (non-Ante) nationalist names.

[51] These results are not sensitive to conditioning on electoral-district fixed effects, party fixed effects, or the right-wing-party indicator, consistent with our focus on within-slate differences.

to Croatia's eastern border, i.e., for the electoral districts directly affected by the WoI. The remaining columns show coefficients based on the remaining districts. Candidates named Ante receive a sizably higher share of preferential votes cast for right-wing slates in electoral districts affected by the WoI.

Our main analysis focuses on the behavioral signal of nationalist names during wars. When we additionally investigate the voting-behavior content of nationalist names in peacetime, we obtain first-step tentative results that are consistent with the notion of long-lived effects of wars on political identity and that support an association of nationalist (patriotic) behavior in a war with right-wing voting patterns twenty years after the war. That name choices predict both war behavior and right-wing election behavior links our main set of findings to the recent evidence on within-family transmission of right-wing attitudes over generations (Avdeenko and Siedler, 2017; Ochsner and Roesel, 2016).

2.8 Conclusions

In this paper, we demonstrate that name choices corresponding to war leaders can predict offspring's adult-life behavior in a life-and-death situation—in a war for national independence. The effect of sharing one's first name with the leader of the WWII Croatian state on volunteering for war service during the 1991-1995 war is comparable to that generated by one's birth place being under enemy siege or occupation. Having such a name also increases the risks of being killed in action by about 50% compared to the average risk level. The values approximated by first name choices corresponding to previous war leaders are also plausibly associated with the choice of an authoritative parenting style and are linked to right-wing voting behavior in peacetime.

These findings have value added on several fronts. First, our evidence on the signal value that names chosen by parents (and, hence, presumably values inculcated by parents) have for offspring's behavior in a deadly conflict supports the notion that political identity matters in high-stakes decisions. This is relevant for the growing literature measuring political identity (e.g., Bursztyn et al., 2014; Rico and Jennings, 2016). Since first names can carry a meaningful signal about nationalism (patriotism), they can be used to study the spread of such values, and, potentially, as input into the study of ethnic and civil conflicts (e.g., Rivera, 2008; Novta, 2016; Spolaore and Wacziarg, 2016).

Second, we provide novel evidence on the intergenerational transmission of values that are in principle difficult to elicit in surveys. We support the notion of cultural purposeful

transmission of values for values that can be extremely costly to children. Our findings are consistent with fathers who have strong nationalist views acting upon the nationalism-transmission trade-off between within-family and society-wide channels suggested by the Bisin and Verdier (2001) model of purposeful intergenerational transmission of values. Other fathers, however, simply appear to follow the regional trends in their name choices for newborn sons. We also suggest that nationalist-name choices are plausibly associated with authoritative parenting styles. These findings are similar to those Campante and Yanagizawa-Drott (2015) uncover in their study of intergenerational transmission of war service across several US wars.

Third, our study of the active engagement in the delivery of an extremely costly public good suggests that the living memory of a previous war allows nations to deal with the collective action problem of participation in a current war. Here, our results are also complementary to those provided by Campante and Yanagizawa-Drott (2015). In comparison to their examination of US war service decisions, we study war participation in an extreme situation of massive volunteering and dying in a war.[52]

Fourth, our analysis suggests a link between the study of inter-generational transmission of preferences and the research on parochial altruism. Specifically, it suggests that the elevation of parochial altruism induced by direct war experiences (Voors et al., 2012; Bauer et al., 2016) can be made persistent through intergenerational transmission of values. Our empirical strategy can be employed to test intergenerational versions of questions posed by the parochial altruism literature. For example, are name choices corresponding to war leaders associated with stronger contributions to nation building after the conflict? Does the intergenerational transmission of values related to previous war experiences (as reflected in name choices) lead to persistent biases[53] and sow the seeds of future conflicts?

Fifth, we find that name choices corresponding to previous war leaders predict not only patriotic behavior in a current war for national independence, but also voting behavior in peacetime. Our first-step investigation of the right-wing-voting content of nationalist names provides support for the growing literature (e.g., Fontana, et al., 2016) arguing that the effects of wars on political identity are long-lived and depend on the extent of direct war experience. It also relates our main set of findings to the recent evidence

[52]Our analysis is related to Shesterinina (2016) who argues that social structures channel information that is critical for mobilization decisions in the Georgian-Abkhaz war of 1992–93.

[53]Shayo and Zussman (2017) ask about the persistence of the effects of conflicts on bias towards co-ethnics.

on intergenerational transmission of right-wing attitudes (Avdeenko and Siedler, 2017; Ochsner and Roesel, 2016).

Finally, we provide new evidence on the Croatian War of Independence. In the Croatian case, and possibly more generally during the decades when six distinct nations shared the Yugoslav federation, names carried an informative signal, accumulated through history, geography, and ethnic identity, about their owners' political values.[54] This allows us to use name choices as a group-level signal of political preferences. The use of names of Croatian WWII leaders, which was high during WWII but ebbed later, rebounds starting in the 1970s and peaks during the 1991-1995 War of Independence.[55] In WWII concentration-camp locations, the popularity of these names never regains its WWII popularity, not even during the War of Independence.[56] In contrast, the use of nationalist names reaches local WWII levels immediately after Croatian control is re-established in locations that were under extended Serbian siege or occupation during the independence war and in areas with high exposure to combat operations during the war. One view of the Yugoslav wars is that after years of peaceful coexistence, violence erupted unexpectedly (e.g., Bardhan, 2005, p. 169). Our evidence on the nationalistic content of the Ustaše-linked name Ante together with the continuous rise in the popularity of nationalist names during the 1970s and 1980s is perhaps better aligned with the alternative notion that internal wars stem from accumulation of protracted sentiments and conflicts (Fearon and Laitin, 2003), and that the strength of nationalism in Croatia was increasing for over a decade before the war erupted.

Our measurement approach is applicable to periods of heightened nationalist tensions and to internal or external conflicts where leader's names are notoriously associated with their actions and political beliefs. For instance, if one finds that the use of names corresponding to leaders of Nazi Germany is over-represented among supporters of right-wing parties in post-WWII Germany, one could use accessible name statistics to map the evolution of such values over populations not covered by survey data directly eliciting such

[54] While we focus on names linked to the fascist history of Croatia, left-wing and, indeed, anti-fascist forces have always been strong in Croatia. The Yugoslav Partisan movement during WWII, which in Croatia included disproportionate shares of Serbian fighters and leaders, is often considered Europe's most effective anti-Nazi resistance movement. Anti-fascist Croatians were among the victims of the Ustaše dictatorship.

[55] First names corresponding to the dukes and kings of independent Croatia, i.e., of Croatian rulers from the 9th, 10th, and 11th century, also became dramatically more popular during the 1970s and also experienced a spike during the War of Independence. There are too few men born with these names who could participate in the war for us to focus on these names in our analysis.

[56] See Charnysh and Finkel (2017) for a study of long-term effects of concentration camp locations.

values. Similarly, using our approach, one could explore the information content and the prevalence of first-name choices corresponding to prominent generals of the US civil war or to differentiate Ukrainian and Russian versions of several first names in Ukraine during its conflict with Russia. Our approach is widely applicable, feasible in many historical settings thanks to the existence of birth certificate records in most countries, and it lends itself naturally to the study of intergenerational transmission of political values. Similar to, e.g., Oto-Peralías (in press), our analysis illustrates how, given the scarcity of political and cultural data at the local level, name choices can provide a valuable source of information for quantitative empirical analysis in social sciences.

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Figures

Figure 2.1: Croatian Army Size and Composition

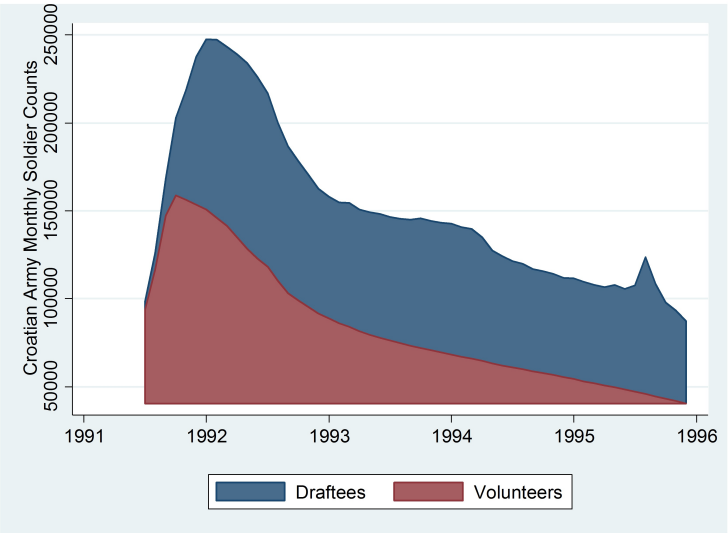


Figure 2.2: Monthly Soldier Death Rates

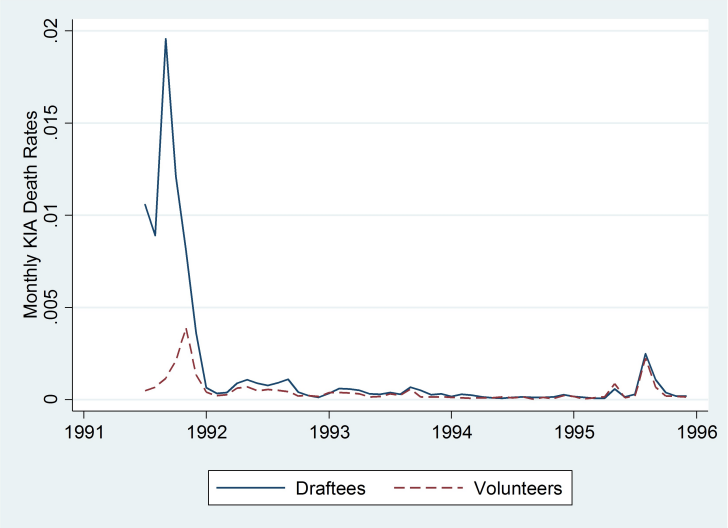


Figure 2.3: Shares of Ante and other nationalist names in birth cohorts

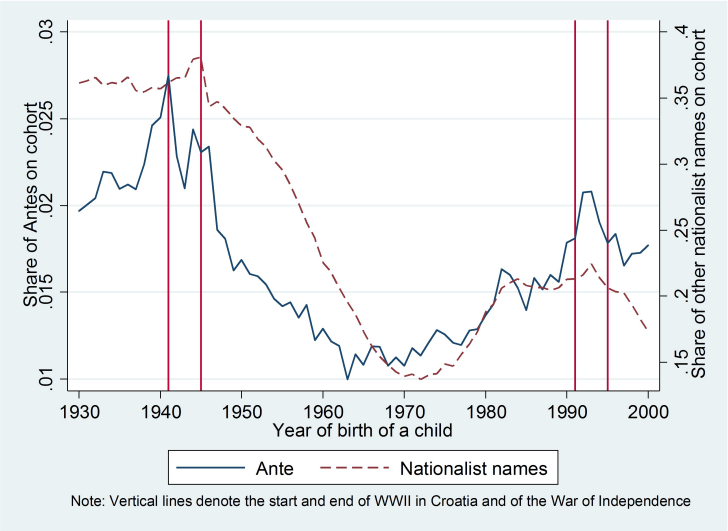


Figure 2.4: Shares of Ante and other nationalist names on cohort in concentration-camp locations

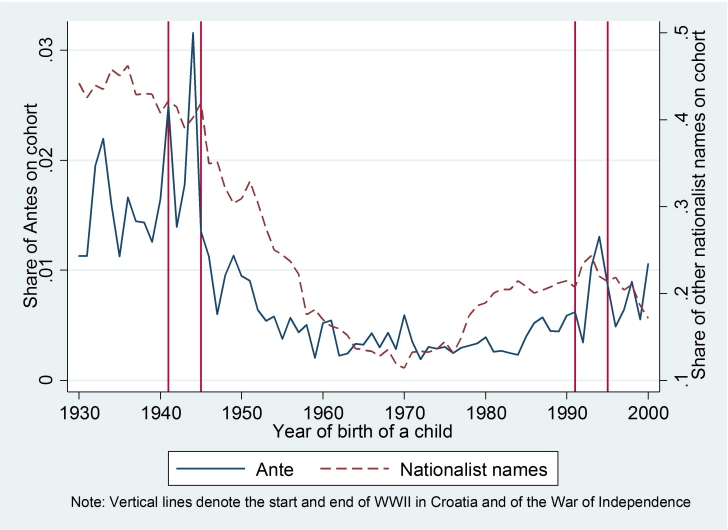


Figure 2.5: Shares of Ante and other nationalist names on cohort in high-KIA-share locations

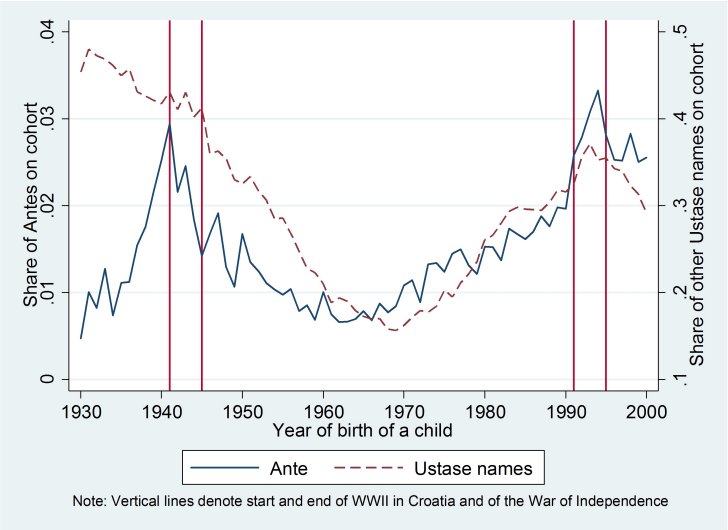
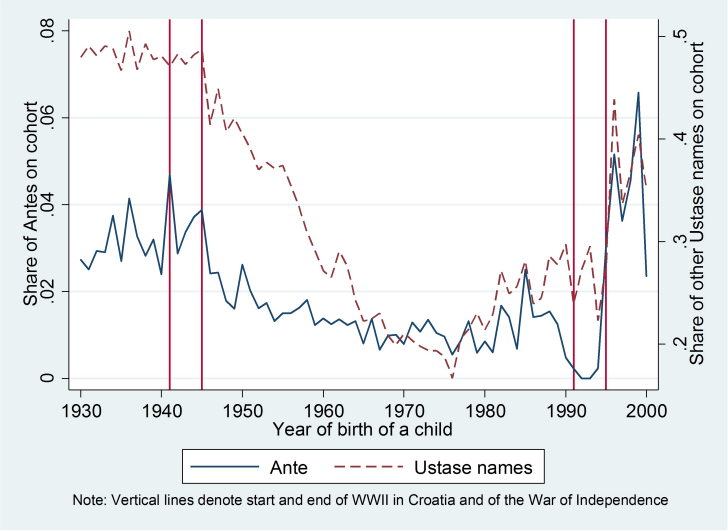


Figure 2.6: Shares of Ante and other nationalist names on cohort in siege areas



Tables

Table A1: Predicting Volunteering

	(1)	(2)	(3)	(4)	(5)	(6)
Ante	**0.0572**	**0.0434**	**0.0411**	**0.0420**	**0.0397**	**0.0391**
	(0.0067)	(0.0036)	(0.0032)	(0.0035)	(0.0037)	(0.0037)
Other nationalist name	**0.0364**	**0.0243**	**0.0197**	**0.0187**	**0.0253**	**0.0244**
	(0.0103)	(0.0067)	(0.0058)	(0.0052)	(0.0063)	(0.0068)
Top-10 name		**0.0152**	**0.0150**	**0.0168**	0.0057	**0.0153**
		(0.0068)	(0.0062)	(0.0068)	(0.0059)	(0.0070)
Siege settlement		**0.0486**	**0.0710**	**0.0507**	**0.0785**	**0.0470**
		(0.0056)	(0.0055)	(0.0047)	(0.0087)	(0.0057)
Ante * Siege settlement						**0.0831**
						(0.0057)
Other nat. name * Siege s.						0.0004
						(0.0115)
Top-10 name* Siege s.						0.0168
						(0.0157)
District fixed effects		Yes	Yes	Yes	Yes	Yes
Excluding Civil Defence unit			Yes			
Serbian/Muslim fixed effects				Yes		
Only all-Croat settlements					Yes	
N	354,773	354,773	322,706	480,092	225,444	354,773

Notes: Each column corresponds to an OLS regression explaining the binary volunteering indicator. Bolded coefficients are statistically significant at the 5% level based on clustering at the name level. All specifications control for age-in-years fixed effects, an indicator for top-10 non-nationalist names in births occurring prior to 1945, and for the following place-of-birth controls: settlement size, average age, share of employment in agriculture, and share living abroad, all from the 1991 census. The 'Other nationalist name' indicator corresponds to nationalist names other than Ante.

Table A2: Predicting Being Killed in Action

	(1)	(2)	(3)	(4)	(5)
Ante	**0.0063**	**0.0103**	**0.0107**	**0.0048**	**0.0103**
	(0.0010)	(0.0008)	(0.0012)	(0.0012)	(0.0009)
Other nationalist name	**0.0035**	**0.0036**	**0.0033**	**0.0041**	0.0027
	(0.0018)	(0.0017)	(0.0014)	(0.0018)	(0.0014)
Top-10 name		0.0018	0.0018	0.0019	**0.0026**
		(0.0015)	(0.0014)	(0.0015)	(0.0013)
Siege settlement		**0.0188**	**0.0206**	**0.0157**	**0.0181**
		(0.0042)	(0.0038)	(0.0082)	(0.0059)
Ante * Siege settlement					-0.0012
					(0.0059)
Other nationalist name * Siege s.					**0.0184**
					(0.0089)
Top-10 name* Siege s.					**-0.0152**
					(0.0077)
District fixed effects		Yes	Yes	Yes	Yes
Serbian/Muslim fixed effects			Yes		
Only all-Croat settlements				Yes	
N	72,586	72,586	96,281	48,462	72,586

Notes: Each column corresponds to an OLS regression explaining the binary indicator of being KIA during 1991. The sample includes only soldiers drafted during 1991. Bolded coefficients are statistically significant at the 5% level based on clustering at the name level. All specifications control for age-in-years fixed effects, month-of-service-entry fixed effects, an indicator for top-10 non-nationalist names in births occurring prior to 1945, and for the following place-of-birth controls: settlement size, average age, share of employment in agriculture, and share living abroad, all from the 1991 census. The 'Other nationalist name' indicator corresponds to nationalist names other than Ante.

Table A3: Predicting Nationalist Names for Newborn Boys during 1991-1995

Child name	Ante	Ante	Nationalist	Nationalist
	(1)	(2)	(3)	(4)
Concentration camp locations	**-0.049**	0.001	0.001	0.006
	(0.016)	(0.001)	(0.011)	(0.009)
High-KIA locations	0.004	0.001	-0.001	-0.008
	(0.014)	(0.002)	(0.010)	(0.009)
Pre-war share of Antes	**-0.395**	**1.092**		
	(0.150)	(0.019)		
Pre-war share of all nationalist names			**0.772**	**0.959**
			(0.075)	(0.067)
Father named Ante	Yes	No		
Father with any nationalist name			Yes	No
N	2,353	102,718	28,680	79,288

Notes: Each column corresponds to an OLS regression explaining the binary indicator of a boy born during 1991-1995 being named Ante or any 'Nationalist name' including Ante. Siege locations are excluded, as are birth certificates with Muslim or Serbian first names. Pre-war shares of Ante or all nationalist names correspond to the five year period preceding the 1991-1995 war and are calculated at the municipality level. Bolded coefficients are statistically significant at the 5% level based on clustering at the municipality level. All specifications control for municipality size, average age, and share of employment in agriculture.

Table A4: Predicting Candidates' Shares of Preferential Votes Received by Their Slate

	(1)	(2)	(3)	(4)	(5)	(6)
Ante	**0.056**	0.032	**0.071**	0.042	-0.005	-0.006
	(0.018)	(0.027)	(0.014)	(0.027)	(0.005)	(0.005)
Other Nationalist Name	0.035	0.032	0.030	0.022	0.039	0.043
	(0.017)	(0.019)	(0.019)	(0.016)	(0.033)	(0.039)
Ante * Right-Wing Party		0.067		**0.088**		0.002
		(0.050)		(0.042)		(0.007)
Other Nat. Name * Right-Wing Party		0.005		0.021		-0.012
		(0.023)		(0.040)		(0.024)
Electoral District Affected by War	–	–	Yes	Yes	No	No
N	1,216	1,216	678	678	538	538

Notes: Each column corresponds to an OLS regression explaining the candidates' share on the preferential votes received by his slate. Bolded coefficients are statistically significant at the 5% level based on clustering at the electoral district level. The 'Other Nationalist Name' indicator does not include Ante.

2.10 Appendix

2.10.1 Name Classification

Ethnic Names There are 374 distinct first male names on the Catholic (Croatian) calendar and 275 distinct first male names on the Orthodox (Serbian) name calendar. The same Christian saints correspond to different versions of the same name on the two calendars, as in Ivan (Croat version) v. Jovan (Serbian version) or Stjepan v. Stefan/Stepan. 35 names appear on both calendars and we do not code these as distinctly national. With one exception (Marko), all of the top-10 (most frequent) Croatian male names according to the 2001 census (a set which includes Ante) appear on the Catholic calendar.

81% of Croatian-army veterans have names that appear on the Catholic and/or Orthodox calendars. 33,259 of these veterans (7% of all veterans) have names that appear on both calendars and thus cannot be classified as having either Croatian or Serbian nationality. In sum, 74% (354,773) of Croatian-army veterans have a name that appears only on the Catholic name calendar and only 0.4% have Orthodox calendar (Serbian) first names. For completeness, we have also inspected all of the distinct male first names appearing in the veterans register and identified a subset of 885 names as Muslim. (The most frequent Muslim names are Samir, Mirsad, Senad, Safet, Muhamed, Ervin, Ismet, Ibrahim, Omer, and Amir.) Under 2% of veterans have Muslim names. The remaining veterans, i.e., those we do not classify as Croat, Serb, or Muslim, typically have non-Yugoslav names (primarily Italian and English) or have names that appear on both calendars.

Nationalist Names The 'Other nationalist name' indicator corresponds to the first names of the 22 politicians and generals who received the WWII Knighthood of the Independent State of Croatia: Salko Alikadić, Eduard Bunić, Jure Francetić, Franjo Šimić, Ladislav Aleman, Vilko Begić, Rafael Boban, Matija Čanić, Fedor Dragojlov, Milan Desović, Duro Grujić, Artur Gustović, Slavko Kvaternik, Vladimir Laxa, Vjekoslav Luburić, Franjo Lukać, Josip Metzger, Ivan Perčević, Krunoslav Perčić, Dragutin Rubčić, Adolf Sabljak, and Slavko Štancer. Further, we include in the indicator a set of 4 additional names of the Ustaše leaders who were chiefly responsible for the Holocaust in Croatia: The "Jewish question" ideologists Andrija Artuković and Mile Budak, and the following (non-knighted) notorious commanders of concentration camps: Miroslav Filipović and Dinko Šakić.

All of the nationalist names appear on the Catholic calendar; Ivan and Josip are also in the top-10 list of Croatian names based on the 2001 census. Josip Metzger, from the knighted list, was a general and chief organizer of a concentration camp. Ivan Perčević was one of the leaders of the movement; when Ante Pavelić visited Adolf Hitler, Perčević was among the small party of Ustaše leaders to accompany him. Both were executed after WWII. However, both Ivan and Josip have also strong anti-fascist connotations:

The leader of the Partisan resistance movement and of post-WWII Yugoslavia was Josip Broz Tito. There are also well-known Partisan leaders called Ivan (e.g., Ivan Rukavina). It is difficult to define a separate Partisan-name indicator since a large fraction of Partisan leaders were Serbs. Instead, we provide direct comparisons between the effects of Ante and both Josip and Ivan in Section 2.4. In the Appendix Figure 1, we also contrast the evolution of popularity of all male top-10 names according to the 2001 census. Only the 3 top-10 names we refer to as nationalist (Ante, Ivan, and Josip) peak both during WWII and during the 1991-1995 war.

Name-Type Comparisons In Section 2.4, we compare the 1991-1995 war behavior of men with nationalist names to that of men with Croatian (Catholic-calendar) names. The analysis, which covers a relatively short time period, is not sensitive to including all names and controlling for Muslim- and Serbian-name indicators.

In Section 2.5, we track name patterns for newborns across seven decades, which raises two issues. First, in 'siege settlements', most of which were under Serbian rule for much of the 1991-1995 war, the share of Serbian and Muslim names given to newborns is twice higher during the five years preceding the war and four times higher during the first five years after the war when compared to the share during the five years of the war. This clearly partly corresponds to the changing ethnic composition of these locations. Hence, for the purpose of comparing Croatian nationalist-name popularity across locations, we omit from the analysis in Section 2.5 all newborns with Serbian and Muslim names. Second, across Croatia and also within all three types of locations we consider in Section 2.5, the share of (non-Serbian non-Muslim) names that correspond to the Catholic (Croatian) calendar is declining after 1970. This is related to the increasing popularity of international (English, Italian) names that do not appear on the traditional Catholic calendar. We inspected this trend across the sets of locations and found it to be highly similar both in size and the time pattern. Since our primary goal is to compare time trends across locations differently affected by war experiences, and since choosing a name for a newborn boy outside of the Croatian calendar corresponds to not using a nationalist name, the analysis presented in Section 2.5 is based on using all name types (other than Serbian and Muslim) to calculate the shares of nationalist names on each cohort and birthplace type. After excluding the set of newborns with Muslim and Serbian first names, the main features of Figure **??**, which plots the Croatia-wide evolution of the share of nationalist names, are not materially affected.

Finally, in Section 2.6 we analyze the name choices for boys born during 1991-1995. The fathers of these boys can be expected to have been born before the rapid decline in the use of Catholic names in Croatia; hence, in Section 2.6 we constrain the set of fathers' names (but not sons' names) to those that appear on the Catholic calendar (mirroring the approach used in Section 2.4, where we studied men who were adults in 1991).

2.10.2 Appendix Tables and Figures

Table 2.5: Predicting Volunteering and KIA Across Subsets of Places of Birth

	(1)	(2)	(3)	(4)	(5)	(6)
			Volunteering			
Ante	**0.0657**	**0.0463**	**0.0575**	**0.0685**	**0.0438**	**0.0645**
	(0.0051)	(0.0084)	(0.0049)	(0.0044)	(0.0077)	(0.0078)
Other nationalist name	**0.0385**	**0.0287**	**0.0341**	**0.0392**	**0.0334**	0.0184
	(0.0102)	(0.0125)	(0.0115)	(0.0097)	(0.0117)	(0.0119)
			KIA			
Ante	**0.0046**	**0.0110**	**0.0132**	**0.0068**	**0.0045**	**0.0159**
	(0.0015)	(0.0018)	(0.0015)	(0.0015)	(0.0013)	(0.0022)
Other nationalist name	**0.0051**	0.0031	**0.0061**	**0.0058**	0.0017	0.0038
	(0.0026)	(0.0029)	(0.0016)	(0.0016)	(0.0026)	(0.0028)
Place-of-birth size tercile	Low	Middle	High	–	–	–
Agricultural employment tercile	–	–	–	Low	Middle	High

Notes: The estimates correspond to specifications from column (1) of Table 1 (upper panel) and Table 2 (lower panel) estimated across terciles of either size (population) or agricultural share of employment of soldiers' places of birth. Bolded coefficients are statistically significant at the 5% level based on clustering at the name level. All specifications condition on the following place-of-birth controls: settlement size, average age, share of employment in agriculture, and share living abroad as of 1991. The 'Other nationalist name' indicator corresponds to nationalist names other than Ante.

Table 2.6: Predicting Child Name Choices by Injured Veterans of the War of Independence

	(1)	(2)	(3)	(4)
Child Name	Ante		Other Nationalist Name	
Unit Death Rate	**-0.070**	**-0.0370**	**-0.097**	**-0.185**
	(0.019)	(0.012)	(0.065)	(0.0532)
Father Named Ante	0.008	0.011		
	(0.013)	(0.015)		
Father Has Other			0.011	0.021
Nat. Name			(0.011)	(0.015)
Volunteers	Yes		Yes	
Draftees		Yes		Yes
N	9,499	4,346	9,499	4,346

Notes: The estimates correspond to OLS regressions explaining the probability of a son of an injured (but not killed) veteran of the War of Independence born after his father's war service being names Ante or any other nationalist name. All specifications control for a step function in fathers' age in years and for the following fathers' place-of-birth controls: settlement size, average age, share of employment in agriculture, and share living abroad as of 1991. Bolded coefficients are statistically significant at the 5% level based on clustering at the name level. The 'Other nationalist name' indicator corresponds to nationalist names other than Ante.

Figure 2.7: Cohort Shares of Top-10 Croatian Names

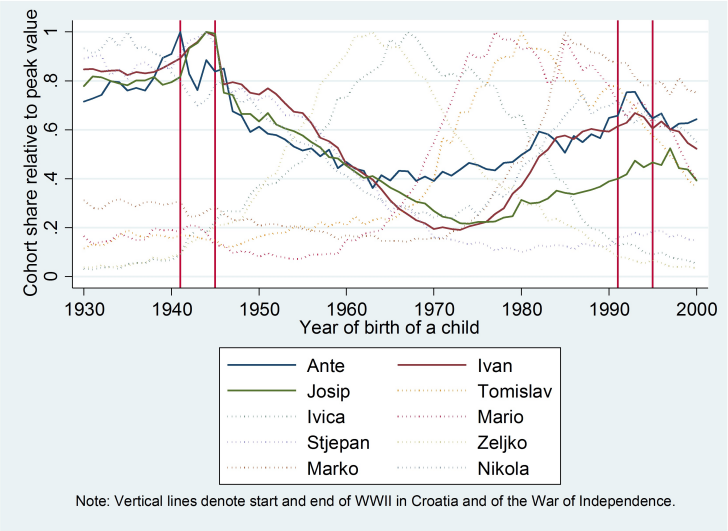


Figure 2.8: WW2 concentration camps areas

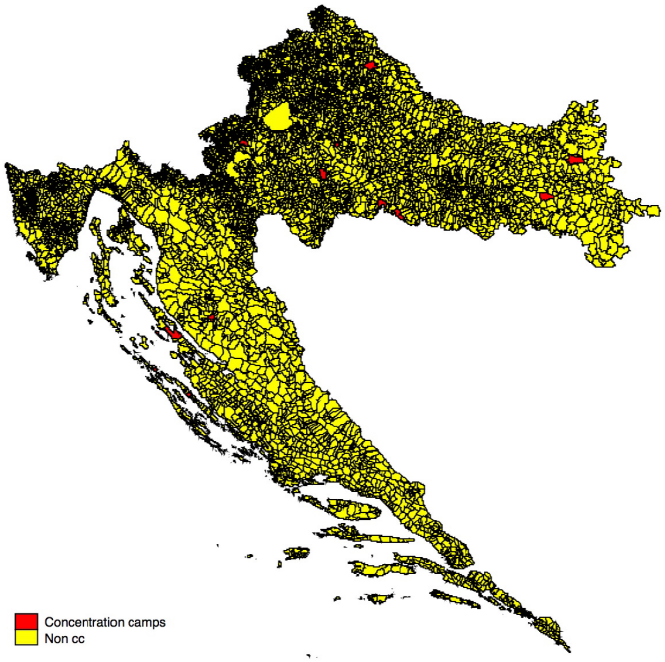


Figure 2.9: WOI High KIA areas

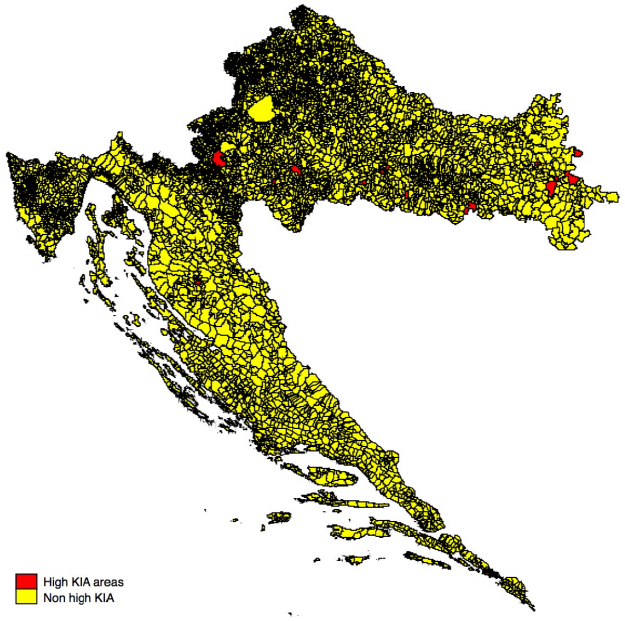
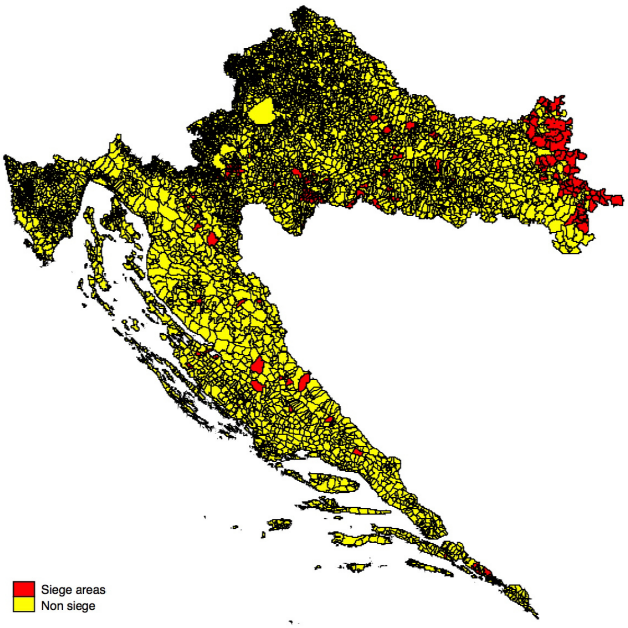


Figure 2.10: WOI War exposure areas



Chapter 3

Beyond the Call of Duty: Intergenerational Transmission of Costs of War

Dejan Kovač and Stepan Jurajda[1]

Abstract

We ask whether the long-term health costs of combat experience are larger for soldiers exposed to higher risk of dying, i.e., to higher killed-in-action (KIA) rates of their units. We study the overall mortality effects and also focus on the suicide effects over a 20-year post-war period using data on all veterans of the 1991-1995 Croatian war for independence. The length of combat service predicts suicide risks, as does the exposure to psychological shocks such as the maximum experienced monthly unit-specific KIA rate. In the second part of the analysis we ask how war-related suicides affect the children of veterans and find significant negative effects on GPA, school absence and school behaviour. Comparing the children of soldiers who served within the same unit, we approximate the amount of psychological shock that each soldier experienced. Subsequently, we analyse the connection between selection into suicides and children's outcomes by comparing two groups of children: those whose fathers died from natural causes and those whose fathers committed suicide, in the post-war period. We find no differences in children's GPA across the two groups,. We find a significant difference in children's performance on high-stakes exams, where outcomes can determine future life trajectories. Remarkably, the children

[1]We would like to thank Janet Currie, James Feigenbaum and Randall Filer for their valuable comments. All mistakes and interpretations are our own. Kovač would also like to thank the Croatian Ministry of Veterans and Ministry of Public Administration for access to the veteran database and birth certificate database, respectively.

of veterans who committed suicide have lower scores on high school state exams than the children of veterans who died of natural causes. These findings are evidence how war costs are transmitted from one generation to another and how policymakers should internalise these unobserved costs into future policymaking.

3.1 Introduction

Wars have long-term costs that reach far beyond their ceasefire date.[2] The physical and mental health consequences of war experiences for soldiers are a critical component of the overall evaluation of war costs. They are also important for the design of public health systems in which the prime goal is the long-term health of veterans (e.g., Boscarino, 2006). The literature on veterans of major armed conflicts highlights the relevance of combat experience for post-war health outcomes. For example, Cesur et al. (2013) suggest that deployment to combat zones, and exposure to enemy fire and to death, raise the risk of suicide ideation in the post-war period. A key feature of combat experience is that of a military unit, possibly of a small group of co-soldiers with whom one often forms strong social bonds under fire. Our research allows us to track soldiers who served in the same unit during different periods and estimate the magnitude of their social bonds as well as the magnitude of war carnage each person experienced. This is important to proxy the unit-level exposure to psychological shocks during the war. Charuvastra and Cloitre (2008) show that individuals exposed to human-generated traumatic events carry a higher risk of developing Post-Traumatic Stress Disorder (PTSD) than those exposed to non-human generated traumatic events. These studies also consistently identify perceptions of social support both before and after a traumatic event as an important factor in determining vulnerability to the development of PTSD. Social ties before the unfortunate events could mitigate the effects of stress on post-war health thanks to group-based support. On the other hand, strong social ties may magnify the initial trauma when one witnesses the death of comrades. These mechanisms relating (extreme) war experiences among soldiers to their health are of general interest, as stress induced by adverse events

[2]The literature studies the effects on children's well-being, human capital investments, the physical and mental health of civilians, and cooperative behaviour (e.g., Akresh et al., 2012; Ichino and Winter-Ebmer, 2004; Bauer et al., 2016). For example, Bratti et al. (2015) document significant effects of war trauma caused by the 1992-1995 Bosnia and Herzegovina conflict on the mental health of survivors in the general population. Kovac (2017) finds significant negative effects of war-related paternal mortality on children's long-run education and health outcomes

is a key health risk in the general population.[3]

We study the post-war suicide and overall mortality consequences of the combat (carnage) exposure of half a million veterans of the Croatian army involved in the 1991-1995 Croatian war for independence, one of Europe's bloodiest conflicts since WWII. Our analysis shows that 97% of these veterans were involved in combat operations, in which over six thousand soldiers were killed in action (KIA). More than two hundred committed suicide while on active duty before the end of the war in 1995.

We exploit the complete registry of war veterans that allows us to precisely measure the nature of their exposure to KIA deaths to determine whether suicide and overall mortality risks are related to the length of combat service and witnessing of death within one's unit during the war. We study all half million veterans of the 1991-1995 Croatian war for independence from the day they entered the army to the present day. Our analysis is focused on the effect of trauma on suicide and overall mortality. We find that monthly KIA rates of soldiers within the same unit as well as days spent in the army have a strong positive effect on the post-war suicide probability of veterans. Although the extensive margin of war exposure, i.e. days spent in the army, is highly significant, we find no differences in the magnitude of the effect by focusing on particular subpopulations of veterans, such as volunteers and draftees. On the contrary, the intensive margin of war exposure, i.e. the maximum monthly KIA rate within a unit, exhibits a significant increase in magnitude when certain subpopulations are included in the analysis. This provides suggestive evidence that the intensity of psychological trauma experienced in war is the most important risk factor for suicide. This finding is important from a policy perspective, since similar military registries are available in every country and one can easily estimate groups at "high risk" by using a similar methodology.

In the second part of the paper, we ask whether and how these psychological costs of war transfer to the next generation via families of veterans. We find that the largest effect is on veterans' children. The children of veterans who committed suicide after the war have worse GPA, school behaviour, national exam results and are more often absent from school than the children of veterans who served in the same unit, but who did not commit suicide. By comparing the children of soldiers who served within the same unit, we confine our analysis to veterans who experienced approximately the same amount

[3]Stress is strongly associated with mental health (including suicide, e.g., Mann, 1998) as well as physical health (Amick et al. 2002). A large literature investigates whether social networks mediate the effects of stress (e.g., Bolger and Amarel, 2007; Lett et al. 2007).

of psychological shocks. This empirical strategy allows us to estimate how war-related psychological shocks diffuse through time and what the exact human capital costs are for the next generation.

Finally, our contribution lies in disentangling the effect of the loss of a parent from the effect of negative psychological states[4] on veterans' families that precede suicides. We accomplish this by comparing the educational outcomes of the children of deceased veterans who served in the same unit, where one group died of natural causes and the other group committed suicide. In this way both comparison groups are treated with the loss of a father, and the suicide group is more likely to transfer heavy psychological states to children. For school behaviour, school absence and GPA we find no difference in children's outcomes between these two groups. Additionally, we find that the children of soldiers who committed suicide perform worse on high-stakes exams than the children of soldiers who died of natural causes after the war. We cannot say whether this is a genetic component or behaviour that is transmitted through the nurture of children, but we show on a subset of observations that the unobserved psychological states of a parent directly before suicide do not have an effect on children's educational outcomes.

This study opens a new strand of literature by measuring the long-run intergenerational costs of war on an entire population of half of million veterans and their families. By tracking veterans and their families almost 20 years after the war, we shed light on the effect of psychological shocks from war exposure on both veterans and their families. In terms of human capital accumulation, significant costs of war exposure are visible even twenty years after the war. These findings may be used as a backbone for post-war remediation health policies to minimise the suicide rates of veterans and to prevent the transfer of additional costs to veterans' families.

3.2 War Exposure

We rely on three indicators of exposure to the carnage of war. First, we know the total length of combat-operation service for each soldier. On average, the 'at risk' group served

[4]Spiegel and Spiegel (1967) investigate the role of affective states preceding suicides and find a severe presence of alcoholism, self-destructive states and manic-depressive disorders; Hendin, Maltsberger, and Szanto (2007) find that nine affects - desperation, hopelessness, rage, anxiety, feelings of abandonment, loneliness, guilt, humiliation, and self-hatred were evaluated as to their intensity in the patient before the suicide.

466 days in combat operations during the war.[5] Second, we construct two indicators of death exposure within one's own unit. During the war, 6,060 Croatian soldiers were killed in action (KIA). For each soldier involved in combat duty we calculate the maximum monthly KIA risks experienced by his unit during his combat-operation service.[6] On average, soldiers involved in combat duty experienced maximum monthly unit-specific KIA death rates of 0.005 (0.5%) with a standard deviation of 0.015. The typical monthly unit death rates were much lower than the maximum: The soldier-average of median (as opposed to maximum) monthly unit-specific KIA rates is 0.0005, i.e., ten times lower than the maximum. For each soldier, the median and the maximum death exposure together with the length of combat duty provide a coherent picture of the stress generated by KIA deaths within one's unit. We need to account for both the intensive and extensive margin of war exposure, since the literature finds both effects significant.[7]

A key feature of our analysis is that we compare these effects for volunteers and draftees. On average, volunteers are likely to be more strongly motivated to fight for their country than draftees. Volunteers also have more control over their exit from the service, such that their length of service is likely to be more endogenous than for draftees. This fact might be important because, according to Skogman et al., (2012), the lack of a sense of control is an important factor contributing to suicide risks. Both groups had little control over the maximum death rate they would be exposed to, as this was driven by unit deployment decisions. The comparison of the effects of maximum death exposure across the two groups thus speaks to the differences in the mental health effects of war on two qualitatively different sub-populations. We find relatively little difference in the estimated effects, suggesting that the endogeneity of volunteering plays little role.

Our analysis builds on and contrasts in its findings with the first long-run exploration of the health consequences of combat exposure provided by Costa and Kahn (2010), who find that wartime stress as measured by unit-specific mortality rates during the US Civil War are related to higher mortality rates conditional on surviving at least 35 years after

[5]According to http://www.uswings.com/about-us-wings/vietnam-war-facts/ "The length of combat duty is comparable to average time during Vietnam war, which was 12 months for Army personnel and up to 13 months for Marines."

[6]For two soldiers serving in the same unit, their maximum unit-specific death rate will thus differ depending on in which months of the war the two soldiers were involved in combat duty. Using this approach we also capture time-varying unit specific war-exposure that a standard fixed effects regression may not capture.

[7] According to King et al. (1999) war-zone stressors appeared preeminent for PTSD in men; Sharkansky et al. (2000) examined relationships between the method of coping with combat-related stress and psychological symptoms among Gulf War Army personnel and found strong connections depending on what method of coping soldiers were practicing.

the war. They also find that men who served in more cohesive companies were less affected in terms of their mortality by combat-exposure stress. Given that the analysis in Costa and Kahn (2010) is closely related to ours, it is useful to contrast the two analyses in detail. First, while Costa and Kahn ask whether the fraction of one's military unit who died of wounds in a 19th century war explains the mortality of 7,700 veterans once they were granted an old-age pension, we study the mortality of almost half a million veterans during the first 20 years after a modern-era war.[8] Hence, our analysis is not affected by potential survival bias related to the mechanism we are studying. Further, we can contrast the effects of combat exposure across age groups. Second, Costa and Kahn (2010) derive a measure of company cohesion based on defection behaviour. This approach is not available to us, but our data covers the timing of entry into and exit from active duty and distinguishes volunteers from draftees. It thus allows us to explore dimensions of cohesion that were not available to Costa and Kahn (2010). Specifically, we contrast the stress effects of death within one's unit across cohesion groups corresponding to volunteers vs. draftees, corresponding to soldiers born in the same region or city, and corresponding to soldiers who entered the unit in the same month and served together longer. Similar to the setting in Costa and Kahn (2010), the structure of units as well as their varying combat exposure in our study is plausibly exogenous. In both analyses, soldiers in more cohesive units were more likely to be killed in action. While Costa and Kahn (2010) find that members of more cohesive companies deal with wartime stress better in terms of their mortality rates in peace-time, we find that losing unit members who are close (in terms of the volunteer / draftee distinction) worsens the mortality consequences of combat exposure. Our analysis, unlike that of Cost and Kahn, also highlights the predictive power of the maximum (monthly) exposure to carnage as opposed to the effect of the overall death rates in one's unit during the entire war.

Our data, while substantially larger than that studied by Costa and Kahn (2010), has two important weaknesses: First, the definition of the units we observe in our data varies in its aggregation level from platoons to regiments. While this may lower precision, it should not bias our estimates. Second, we only observe unit assignment as of the end of the war. Hence, to the extent that soldiers switched units during the war, our analysis suffers from measurement error. Given the likely presence of attenuation bias,

[8] Port, Engdahl, and Frazier (2001) indicated that PTSD symptoms are highest shortly after war, then decline for several decades to follow, and then again increase when the veteran reaches retirement age.

our statistically significant estimates thus may present a lower bound on the total wartime stress effects. We assess the sensitivity of our results to the unit-assignment measurement issue by focusing on the subset of soldiers who joined the army in the first (most deadly) months of the war and left the service within six months of enlisting. Unit switching is more likely among soldiers serving for up to the full length of the 1991-1995 war and less likely for the whole army after the spring of 1992, when organised conscription started.

Our analysis significantly extends a growing, mainly US literature on the mental health effects of combat service. Descriptive evidence is growing on the health correlates of combat exposure: Kaplan et al. (2007) estimate that men who served in the US military were twice as likely as were non-veterans to commit suicide, and Blow et al. (2012) update these results with similar conclusions. Sheffler et al. (2015) uncover poorer health among US soldiers deployed in combat as opposed to those serving in non-combat zones. Similarly, Sutker, Allain, and Winstead (1993) and Seal et al. (2009) show that combat exposure is associated with higher risk of PTSD, and Shen et al. (2009) point out that the length of combat service is related to mental health.[9]

Assignment mechanisms determining who is exposed to combat duty and thus to the main death risks of war, i.e. military service participation and combat deployment, could potentially be related to soldier unobservables including mental health predispositions. US studies of the health effects of military service have addressed the endogeneity of military service by using the draft lottery as an instrument (e.g., Hearst et al., 1986; Bedard and Deschenes, 2004, Angrist et al., 2011).[10] Conditioning on military service and using a plausibly random source of combat exposure (deployment assignment), Cesur et al. (2013) show that US soldiers deployed to combat zones since the 1990s and witnessing deaths had higher risks of suicide ideation. Using a similar strategy, Cesur and Sabia (2016) show that combat exposure increases the probability of domestic violence.

Unlike all of the existing literature, which is surveyed in more detail in Cesur et al. (2013) and Sheffler et al. (2015), we employ complete veteran records, i.e., we do not rely on a survey or a set of patients of a particular hospital. More importantly, we are uniquely able to precisely measure the extent of carnage witnessed by each soldier. Cesur and Sabia (2016), who represented the state-of-the-art measurement in the literature, estimate the effects of combat exposure measured by answering a survey question about

[9] In closely related work Grieger et al. (2006) study US soldiers who were seriously injured in combat to link PTSD and depression to the severity of physical problems caused by the injury.

[10] Card and Yakovlev (2016) represent a recent addition to the literature on conscription effects based on Russian data and peacetime conscription.

having experienced incoming fire or having one's own unit fire on the enemy. In contrast, we measure the share of one's unit that perished in the war, and separately for volunteers and draftees, as the social links and the associated health cost of co-soldier death could be stronger within these two groups (within units) than across.

3.3 The Croatian War of Independence in Our Data

In 1991 Croatia declared its independence from the Yugoslav federation. The Croatian war of independence, referred to as the Homeland War in Croatia, was fought from 1991 to 1995 between the Croatian army and the Serb-controlled Yugoslav People's Army (JNA) and local Serb forces opposing the secession. During 1991 and 1992, the JNA conducted combat operations in Croatia and helped establish the Republic of Serbian Krajina covering the quarter of Croatian territory corresponding to areas with ethnic Serb majorities. After the ceasefire of January 1992, the front lines were entrenched until 1995 when Croatia launched two offensives known as Operation Flash and Operation Storm, which effectively ended the war in its favour. Approximately 20,000 people were killed in the war, most of whom were civilians.[11]

The Croatian draft was not a lottery, but draft rates were unrelated to recruitment characteristics other than their military specialisation, which is not observable to us. To the extent that suicidal tendencies do not differ across military 'occupations', one may consider the draftees a quasi-random sample of the population. Similarly, unit combat deployment during the Croatian war was not under the control of individual soldiers. Similar to Hearst et al. (1986), we focus not only on suicide risks, but also on accidental deaths, which could correspond to either risky behaviour of veterans with mental health problems or to suicides coded as accidental deaths. Our work is also relevant for the study of longer-term wellbeing consequences of wars, the Yugoslav wars in particular. Here, Grubišic-Ilić et al. (2002) find that suicide rates in Croatia were higher in areas more affected by the war while Shemyakina and Plagnol (2013) study subjective well-being and find no effect of war exposure on well-being.[12]

Our primary data source is the registry of military personnel of the Croatian Ministry of Veterans, which includes information on 480,094 male soldiers serving during the

[11] Tabeau and Bijak (2005) illustrate the difficulty of forming estimates of total casualties in the Yugoslav war.

[12] Case and Deaton (2015) ask whether suicides correlate with measures of wellbeing.

war,[13] 97% of whom were involved in combat operations. During the roughly eight million man-months these soldiers spent in active duty during the war, 6,060 (1.3%) were killed in action (KIA)—a category which in our case includes deaths caused by wounds sustained in action as well as deaths in captivity.[14] We also observe an indicator for being wounded during the war: 62,336 (13%) of soldiers were wounded. In addition to the KIA and wounding indicators, which determine veteran benefits available to veterans or their families, the Ministry of Veterans also collected a suicide indicator for all deaths up to 2015.

3.3.1 Croatian Army Size and Composition

At the start of the war, Croatia had no regular army since the JNA was under Serbian control. The Croatian army was thus initially formed from volunteers and grew in size significantly in late 1991, when the regular draft process started based on the registry of Croatian nationals who had served earlier in the JNA.[15] [16] The draft did not proceed by cohorts, but was based on reservists' expertise from their JNA service.[17] In total, there were 162,268 male volunteers serving during the war and 317,826 draftees.

The heaviest fighting occurred in late 1991 when JNA entered Croatia: 55% of the 6,060 KIA deaths occurred during the first six months of the war. The evolution of monthly death rates, i.e., of the ratio of soldiers dying in a given month to the number of active-duty soldiers as of the start of each month, was calculated on aggregate and also for each particular unit.

The war was at its deadliest in the fall of 1991 when Croatia was under attack and in August 1995 when it launched Operation Storm. Clearly, soldiers drafted during 1991

[13] We exclude from the analysis the 5% of female soldiers who all served in non-combat support jobs.

[14] In total, 9,378 soldiers died during the war. For 7,346 of these we observe the reason for death, which implies that 5,659 soldiers (77%) were killed in action. We do not know the cause of death for 401 soldiers who died while in active duty. Since three quarters of those who died on active duty during the war with known types of death were killed on action, we assume that these 401 soldiers were also killed in action. Deaths in captivity are deaths within concentration camps.

[15] The Croatian Act of Defense made military service mandatory for all reservist males aged 18 to 65. Failure to respond to the draft call within 8 days resulted in prosecution and imprisonment. There were fewer than 2,500 draft avoiders according to local sources. Exemptions from service were possible on health grounds, but the medical checks were strict and exemptions seldom granted.

[16] The status of a volunteer is governed by the Croatian Act of Homeland War Veterans. The same law defines major injury (as opposed to minor injury). Both volunteer and injury status affect welfare support available to veterans of the Croatian war of Independence.

[17] The monthly draft inflow into the army remained in the low thousands with the exception of four months: Over 20 thousand men were drafted in each of the last three months of 1991 as well as in August 1995.

faced particularly high risk of death. This could be due to selection: volunteers may be relatively more skilled soldiers, particularly during the first few months of the war. Further, volunteers joined the army first and served longer; at a given point in time, they are thus more likely to serve in higher ranks than draftees.[18] Unfortunately, our data does not include rank and this complicates the analysis of KIA death determinants as rank is generally negatively correlated with the chances of dying in a war. This issue may, however, be of minor importance in our data given that the draftee and volunteer death rates converged by the beginning of 1992 and, in particular, given that they were almost identical towards the end of the war in the two offensives of 1995 as our analysis shows.

Croatia consists of 21 administrative counties (provinces). Most of the fighting occurred along Croatia's eastern border. 42% of KIA deaths occurred in the province of the soldier's birth; in large part, volunteering and deployment patterns are responsible for this high share, but it could also be that soldiers are willing to face higher combat risks when fighting close to home.[19]

Part of our analysis is based on merging the veterans registry with municipal-level data from the 1991 Croatian census based on the soldiers' place of birth. There are 6,759 municipalities divided into 21 counties. These municipalities were affected by the war in a most uneven fashion. In particular, a set of 177 municipalities was under extended siege by the JNA during the war, hereafter we refer to these locations as the *siege municipalities*.[20] Given the uneven exposure to the war, it is not surprising that across the 21 counties, the share of volunteers on all serving army personnel in 1991 and 1992 varied from 6% to 50%, with an average of 34%.

The number of units in the Croatian army quickly grew from 579 as of July 1991 to about 650 for the remainder of the war. The highest unit-averages of monthly unit-specific death rates were experienced between September and November of 1991, when they remained around 0.03. For the remainder of the war, the unit averages of unit monthly death rates remained below 0.01, with the exception of the summer of 1995.

[18]The average length of service for soldiers who did not die during the conflict was 932 days for volunteers and 357 days for draftees. For example, Ante Gotovina, who already had combat experience in 1991 when he volunteered for the Croatian army, became a leading general during the 1995 Operation Storm. He was later indicted for war crimes in connection with the operation, but was cleared of the charges by an appeals panel.

[19]Almost a quarter of KIA deaths occurred in the province of Vukovar, close to the Serbian border. Soldiers born in this province also faced the highest KIA risks during the war: almost 4%.

[20]This set was defined in the Act on Areas of Special State Concern passed on May 17th 1996.

Excluding units with fewer than 10 soldiers, the Croatian army was composed of between 282 and 310 units, which, on (unit) average experienced monthly unit-specific death rates close to 0.03 during September to November of 1991, and below 0.01 for the remainder of the war. During the heaviest fighting in the fall of 1991, unit-specific death rates for volunteers were close to 0.01 and dropped to low levels afterwards. However, the maximum unit-specific death rate among volunteers was 0.37 to 0.70 during the first five months of the war, and was still as high as 0.27 in month fourteen and remained in single percentage points subsequently. For draftees, the average unit monthly death rate was above 0.02 from September to November of 1991 and the maximum of this rate (across units) was 1.0 until month seven from the start of the war, meaning that all draftees in at least one unit died that month. Additionally the average monthly unit death rate was at 0.33 in month fourteen, and stayed in single percentage points for most of the following months.

3.4 War Exposure and Post-War Suicides of Veterans

The first step of our analysis is to test demographic and socio-economic variables before the war for selection into suicides. The results will help us to determine whether there is a systematic element that was driving the selection. We do not have many pretreatment variables at the individual level that could test the hypothesis, but we use Croatian Census data to approximate the main variables. The War started in late 1991 and we use the Census data collected immediately before the War. For almost a half million veterans we observe their place of birth and we are able to match it to the lowest level ZIP code.[21] For municipality size, average age in municipality, share of migrants in the municipality, share of Catholics and Orthodox, we find no statistical difference between soldiers who committed suicide and those who did not.[22] The last two variables are particularly important since the conflict zones during the war were in areas of high ethnic mixture. The lack of differences in soldiers' municipality level characteristics indicates that there are no idiosyncratic municipality level variables that are driving the selection into suicide.

Since there are no idiosyncratic elements at the municipality level before the war

[21] We have 6,759 "naselje" geographical units of lowest zip level.

[22] We find a statistical difference between the two groups in the share of Croats and Serbs at the municipality level. Although statistically different, in terms of magnitude the differences are negligible. Veterans who committed suicide come from municipalities where on average there iare 0.023% more Serbs and 0.021% less Croats. We also contribute these differences to missing observations both from the veterans registry and the 1991 Census.

that might be driving the selection into suicide, our next step is to test the elements that occurred during the war, such as war exposure. To be able to estimate the effect of war-related psychological shocks on the post-war probability of veterans' suicides, we calculated unit-specific monthly KIA death rates and overall death rates.[23] We distinguish the two because: for a soldier to be psychologically affected, he/she does not have to be present, but only emotionally attached to a soldier in the same unit to trigger PTSD. Next, we wanted to have both the intensive and the extensive margin to war exposure, so we used maximum death rates (KIA and total) as a proxy for the intensive margin and days in a war as an extensive margin. One soldier might serve in a war for a long period but experience a small unit-level war carnage, while other soldiers might serve for a very short period and experience large unit-level war-carnage. In our further analysis we test both channels, because plausibly both might be significant.

In Table 3 OLS estimates for both the unit maximum death rate and days in war are positive and significant, 0.028 and 0.002 respectively. After including military unit fixed effects, the effect of unit level maximum death rate reduces to 0.013, but still remains highly significant and positive, which supports our hypothesis of the effect of psychological shocks during the war on post-war suicide probability. The results are very robust to the inclusion of additional control variables, such as the age of a soldier and whether the soldier was wounded during the war. We also tested the effect of the unit-level KIA rate on the probability of suicide and again find a strong and positive relationship. The only difference between the total death rate and the KIA rate is in the magnitude of the effect, with the KIA effect being much smaller, at 0.006. This finding is not surprising since non-KIA deaths cover a larger share of units, and thus the effect is larger.

In Table 4, we ran a series of robustness checks to test the stability of our results. For our two key variables, unit-level death rates and days spent in the army, we tested our model on two different subpopulations of soldiers, volunteers and draftees. We find approximately the same effect on the extensive margin i.e. days spent in the army, 0.002, while on the intensive margin - the unit's maximum death rate, although statistically no difference in estimates there are still large differences in point estimates, 0.058 for volunteers and 0.008 for draftees. Further, we tested how our estimates change if we condition on the composition of the unit. This comparison is to see the differences across units. Soldiers who served in units with a high share of volunteers are more likely to

[23]These include all types of deaths. The data shows deaths that are non-battlefield, that occured during war-service, such as car accidents, etc.

commit suicide than those soldiers who served in units with low shares of volunteers. The magnitude is almost seven times higher. This is not surprising since volunteers served longer and most often started their service at the beginning when the fighting was most severe. FInally, we incorporate the last finding in our analysis and compare soldiers who served from the fall of 1991 to spring of 1992, i.e., - "early" timing of entry, and find a much stronger effect than for soldiers who served after that period.

We find that both the intensive and extensive margins of unit-level war exposure have a positive and a significant effect on the post war probability of suicide. While the extensive margin, days spent in war, remain unchanged through our robustness checks, the intensive margin, unit-level max total death rate and KIA rate exhibit differenced in magnitude. This provides suggestive evidence that the magnitude of psychological shock, not the duration of war experience, is a decisive factor that affects the probability of a suicide.

3.5 Intergenerational Costs of War

Besides the direct health and suicide costs of veterans presented in the first part of this paper, there is an apparent indirect cost of war that transmits to families of veterans. In this section we focus on the long-run costs of war for families of veterans. Channels of long-run war effects studied are: war-related suicides and war-related injuries of parents that might affect children's long-run human capital accumulation. As shown in Kovac (2017), losing a father during the war has long-lasting negative effects on children. In this analysis we focus only on the post-war suicides of veterans. It is evident from the first part of our analysis that exposure to war carnage has a significant effect on the post-war probability of a suicide. Since war exposure, and therefore any psychological costs attached to it, was different across units, we compare outcomes of the children of fathers who served in the same unit[24].

A veteran's decision to commit suicide might be correlated with family level unobservables that also influence children's long run outcomes. For instance, severe psychological states, such as depression, are often a sign of suicidal intentions[25] and the build up to suicide might influence children's long run outcomes before the actual death. Our empiri-

[24]War exposure within the same unit is not considered completely uniform. We provide a series of robustness checks by comparing soldiers within the same unit, but across dates with high and low battles.

[25] Brown et al. (2000) classify the main risk factors that precede suicides: depression, hopelessness and suicide ideation.

cal strategy, aims to disentangle the psychological effects of parental suicide on children's outcomes by comparing the children of soldiers who committed suicide and those who died of natural causes[26].

The data used in this part of our research is the registry of the Ministry of Science and Education that contains all elementary and high school grades for all children in Croatia for the period 2008-2015. In addition, we used the registry of high school level national exams of Croatia for 2010-2015. We were able to match these two registries with the registry of Veterans, which also contains all children of veterans, in order to have panel data of education outcomes in elementary and/or high school: school GPA, school absence measured in hours and school behaviour.[27] We also observe national high school graduation exams within a cross-sectional dataset.

3.5.1 Effects of Veterans' Suicides on Children's Educational Outcomes

We have already established significant first order effects of the unit level exposure to war carnage on the probability of suicide. To explore the second order effects of war exposure on veterans' families we use a similar empirical approach. We compare the educational outcomes of families of veterans who served within the same unit and thus were exposed to similar risks of dying and injury. Educational outcomes in this part of the analysis are: GPA per school year, school absence in hours and school behaviour. Figure 1 illustrates that the children of veterans who committed suicide have worse GPA than children of surviving soldiers, both injured[28] and uninjured. We find similar results for school absence and behaviour. Next, Table 5 shows that the children of veterans who committed suicide after the war have 0.192 lower GPA scores than children of veterans who served in the same unit but did not commit suicide. The results are robust to the inclusion of additional control variables in Column 2 of Table 5. The negative effect is not statistically different when comparing elementary and high school GPA, 0.112 and 0.179

[26] Dying from natural causes is also non-random and behaviour dependent. Nevertheless, this type of selection into death potentially has less severe psychological build up than suicide; see Brown et al. (2000)

[27] There is no sample selection problem in this part of the research. We are still able to match the whole population of veterans' children; the focus is on the younger part who were in education registries at that time. Children who were not in the registries, because they were too young or too old for elementary or high school, are still controlled for. We observe them in the registry of Veterans.

[28] Only the group of children with 100% disabled fathers do not have statistically different GPA than the group of children who lost their father after the war.

respectively. Next, we find no statistical difference between the children of volunteers and draftees who committed suicide, and thus the unobservables that were driving the selection in the army have no effect. Lastly, we test the effect of civilian war exposure, and thus column 7 of Table 5 includes only children born after war. The negative effect of 0.127 is not statistically different from our main effect and we can exclude war exposure as a long-lasting factor in this analysis.

The second educational outcome of our interest is school absence measured in hours absent a school year. In Table 6, the children of veterans who committed suicide are 20.216 hours more absent than the children of veterans who served in the same unit and did not commit suicide. In column 2 of Table 6, the inclusion of additional control variables reduces the coefficient to 19.578, but it is still not statistically different. Column 4 of Table 6 shows that a father committing suicide affects high school aged children more than it affects those in elementary school. Once again we find no difference in the effect conditional on the father being a volunteer/draftee or the children being born after war.

The third educational outcome analysed is school behaviour. Table 7 shows that children whose father committed suicide have on average 0.134 worse school behaviour, and the results are robust to the inclusion of additional control variables (Column 2). Interestingly, we find no effect on children in elementary school, but strong effects on children in high school. The magnitude of the negative effect is the same across volunteer and draftee fathers, while we find an insignificant effect on children born after the war.

The last educational outcome we consider is national high school exams. Unlike GPA, national high school exams are standardised country-wide exams that provide an unbiased measure of knowledge in mandatory and elective courses. Remarkably, through the majority of robustness checks, we find almost identical results as for GPA. On average, children whose father committed suicide have 0.134 worse national exam results and 0.158 when additional controls are included. When we compare only mandatory courses we find no statistical difference from our main estimate, but for elective courses the effect is much larger, 0.334[29]. In the case of national exams, we find a significant difference across volunteer and draftee fathers. The children of draftee fathers have 0.276 worse national exams results than the children of volunteer fathers. Again, for children born after the war, we find no effect.

[29]This result might be driven by selection into elective courses across the suicide and non-suicide group.

3.5.2 Intergenerational Transmission of the Inability to Handle Stress

The previous section established a significant effect of father's suicide on all considered children's educational outcomes. In this section, we ask whether a different type of death of a father has a differential effect on children's education outcomes. We divide types of death into suicide and non-suicide[30]. The reason for this kind of empirical endeavour is that there is an obvious selection on unobservables into a particular type of death. Death is a non-random process, where selection into each type of death is correlated with unobservable variables that might also be affecting children's educational outcomes. In our case, severe psychological problems are heralds of suicidal intentions. Our analysis seeks to determine to what extent these effects transfer to veterans' families.

The thought experiment is as follows: during the war, veterans were sorted into units. Each unit had a different level of KIA soldiers and therefore different exposure to unit-level psychological shocks. We know from the first part of our analysis that the probability of committing suicide increases with the unit-level KIA rate. After the war, when comparing soldiers who served within the same unit, some survived and died of natural causes, while some committed suicide. The underlying research question is - What makes soldiers who experienced the same amount of war carnage commit suicide while others do not? Is it a genetic predisposition of inability to handle stress or is it correlated with family-level unobservable variables? We test whether these traits are transferred to the next generation.

Table 9 shows the difference between two types of deaths: suicides and non-suicides. For GPA, school absence, and behaviour we find no difference between type of death and children's educational outcomes. On the other hand, we find significant effects on performance in national exams. The children of veterans who committed suicide perform 0.13 grade points worse on the national exam than the children of veterans who died of natural causes. We cannot determine whether low performance on high stakes exams is a result of a genetic inability to handle a stressful situation or whether it is the effect of unobservable psychological states of a family that precede suicides. To shed some light on the latter, we compare educational outcomes before and after particular a type of death. We narrow our analysis to a smaller subset[31] of deaths that occurred after 2007 to have

[30] Non suicide deaths are: died by accident, died in traffic accident and death resulting from illnes.

[31] There is no sample selection problem. We only focus on the most recent deaths and suicides to have at least one data point before death.

before and after measures. If unobserved psychological states that precede suicide are affecting children's educational outcomes, we should observe a dip in a year before the suicide. Figures 2 to 5 show no dip in any of our observed outcomes. In fact, there is no statistical difference in children's outcomes across suicide and non-suicide groups for both before and after death periods. This finding provides suggestive evidence that main channel of effect might not be in differential treatment from different types of deaths, but rather an intergenerational component which is transferred genetically or embedded through upbringing.

3.6 Conclusions

Using a registry of one half million veterans from the Croatian War for Independence, we asked how war-related psychological shocks, through unit-level KIA and death rates, affect veterans' post-war probability of committing suicide. We track soldiers for twenty years after the war and find that both the length of combat service and maximum experienced monthly unit-specific KIA rates have a significant and positive effect on suicide risks. To approximate unified war exposure, we compare soldiers who served within the same unit and calculate unit-level monthly KIA rates for the set of 650 units to capture unit-level time varying exposure to psychological shocks. Thus, two soldiers serving in the same unit, but at different times, can have different exposure to monthly KIA rates. We find that the magnitude of the effect is five times higher for the maximum experienced monthly unit-specific KIA rates than it is for the length of combat service, making it the prevalent factor for post-war suicide risks.

Next, we extend our analysis beyond the first order effects of exposure to war and research the intergenerational costs of war; how these psychological shocks transfer to the families of veterans, and in particular, to their children. By comparing the children of soldiers who served within the same unit, we approximate the amount of psychological shocks that transfers to the next generation. We find that the children of soldiers who committed suicide have worse GPA, school behaviour grades, and are more often absent from school than the children of soldiers who did not commit suicide. Since there is a selection problem into suicides and we do not observe the negative psychological states that precede suicides, we compare the children of fathers who committed suicide with those who died. Remarkably, we find no differences between the two groups in GPA, school behaviour, and school absence, but significant and large differences in performance on high

stakes exams, such as national exams. Children of veterans who committed suicide have worse performance on national high school exams than the children of veterans who died during the same period of natural causes. Since we compare veterans who served within the same unit, and thus who were exposed to similar psychological shocks, we cannot contribute these findings to exogenous events happening during the war, but rather to endogenous variables that are on the family level. The limited number of suicide deaths does not allow us to test whether the effect is nature- a lower inability to cope under pressure transferred through genes or if it is nurture- systematic behavioural patterns that is transferred through upbringing. Nevertheless, it opens a new venue for future research.

To our knowledge, this is the first study that tracks the effects of war exposure on such a large population of veterans and through two separate generations. It also uses a new methodology to estimate which groups of veterans are at highest risk of suicide. By using a similar methodology and with the existence of similar registries in numerous countries, our results are potentially applicable for suicide and mortality prevention programs around the world, to the extent that veterans were exposed to a similar extent of combat events and duty length. Finally, in the unfortunate event that suicide prevention is not possible, policymakers around the world should consider the costs that children bear after the death and compensate for it through remediation policies. Although few countries practice this type of policy, it should be implemented by all countries, since for soldiers it is impossible not to bring your work home.

3.7 Bibliography

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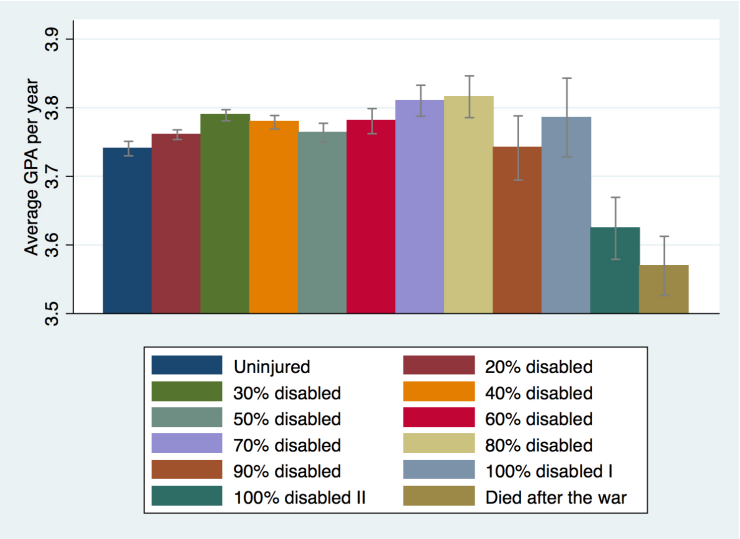
Figures

Figure 3.1: Average GPA by mortality and disability status



Note: Died after war include both suicide and non-suicide deaths.

Figure 3.2: Children's GPA before and after parent's death

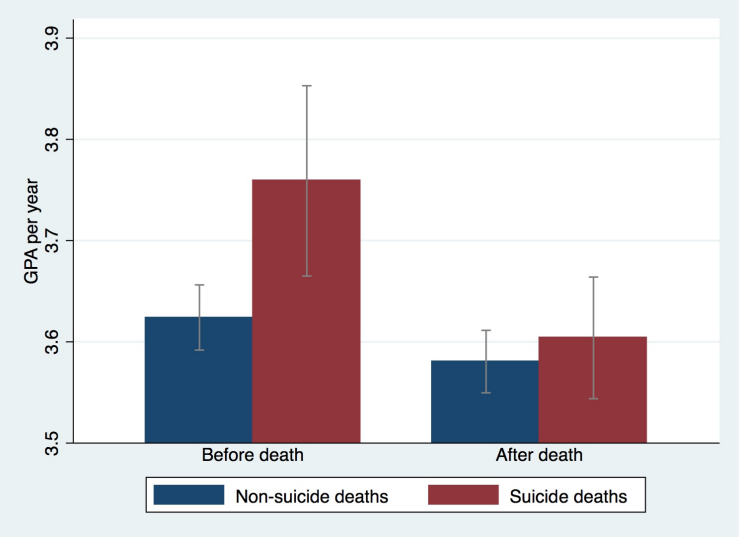


Figure 3.3: Children's school absence before and after parent's death

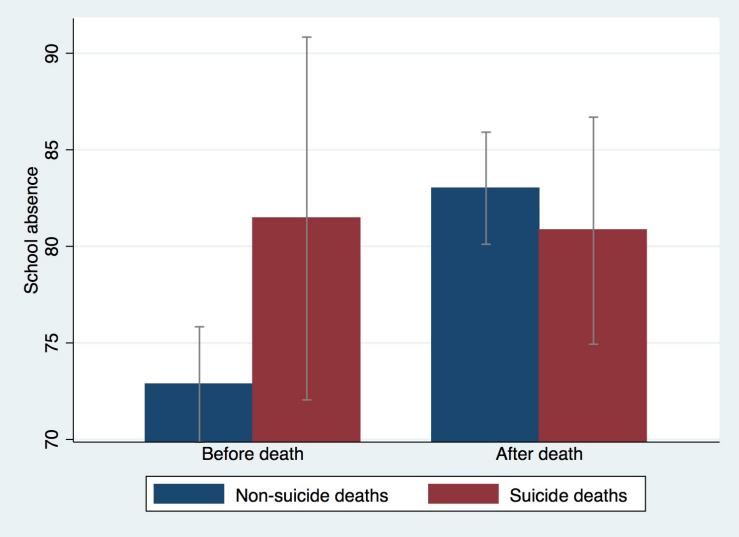


Figure 3.4: Children's school behaviour before and after parent's death

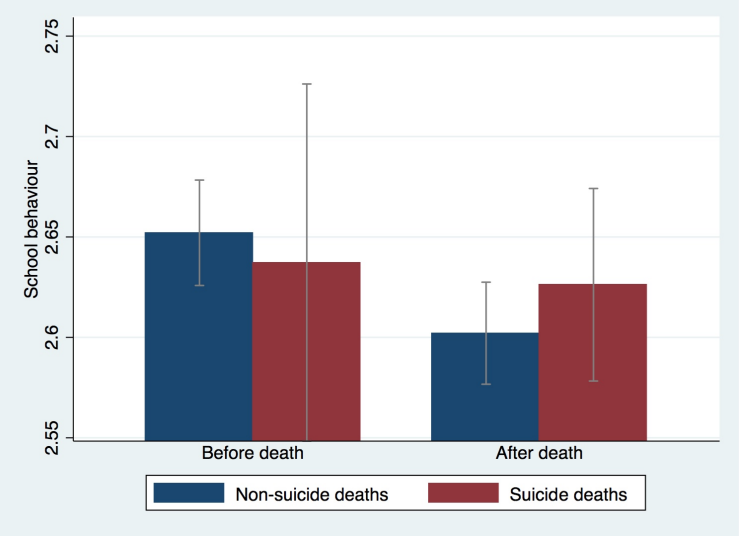
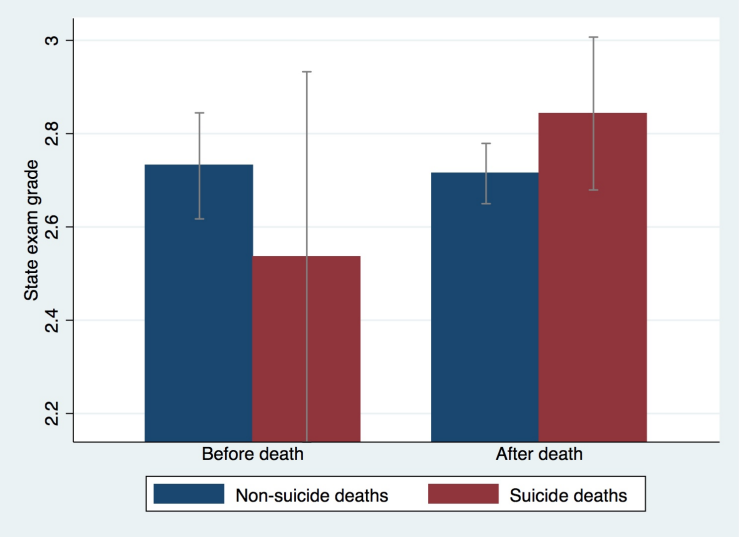


Figure 3.5: Children's state exams before and after parent's death



Tables

Table 3.1: Descriptive statistics of war exposure

	Soldiers in Croatian Army				
Variable name	**Obs**	**Mean**	**Std.Dev.**	**Min**	**Max**
Age	480 092	31.258	8.543	17	70
Days in combat	480 092	448.438	492.134	0	1 644
Days in war	480 092	493.324	522.988	1	1 644
Unit max death rate	473 299	0.017	0.058	0	1
Unit max KIA rate	473 299	0.015	0.056	0	1
	Volunteers				
Unit max death rate	161 021	0.006	0.029	0	1
Unit max KIA rate	161 021	0.006	0.029	0	1
	Draftees				
Unit max death rate	312 278	0.006	0.029	0	1
Unit max KIA rate	312 278	0.005	0.027	0	1

Table 3.2: Selection of veterans into suicide by 1991 census - municipality level data of birth

	Soldiers municipality level characteristics by suicide				
	Non-suicide		Suicide		
Variable name	**Obs**	**Mean**	**Obs**	**Mean**	**diff**
Municipality size	373 432	122 954.2	542	128 988.1	- 6 033.874
		(375.317)		(10 490.01)	
Average age in municipality	373 565	37.383	542	37.538	- 0.154
		(0.005)		(0.132)	
Share migrated in from abroad	373 176	0.167	542	0.159	0.007
		(0.002)		(0.016)	
Share of Croats	373 176	0.804	542	0.783	0.021***
		(0.001)		(0.008)	
Share of Serbs	373 176	0.098	542	0.122	- 0.023***
		(0.001)		(0.007)	
Share of Catholics	359 693	0.738	512	0.720	0.018
		(0.001)		(0.010)	
Share of Orthodox	373 176	0.121	542	0.146	- 0.024
		(0.001)		(0.016)	

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; Discrepancy in number of observations is in missing observations across variables.

Table 3.3: Unit-level War Exposure and Veterans' Suicides

	Dependent variable: Probability of Suicide						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unit max death rate	0.028***		0.013***		0.009***	0.010***	
	(0.001)		(0.002)		(0.002)	(0.002)	
Days in war in 000		0.002***		0.002***	0.002***	0.002***	0.002***
		(0.000)		(0.000)	(0.000)	(0.000)	(0.000)
Unit max KIA rate							0.006**
							(0.002)
Controls	-	-	-	-	-	yes	yes
Unit FE	no	no	yes	yes	yes	yes	yes
Constant	0.001***	0.001***	0.001***	0.001***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	429 977	436 423	429 977	436 423	429 977	429 977	429 977

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *;

Table 3.4: Unit-level War Exposure and Veterans' Suicides - Robustness Check

	Dependent variable: Probability of Suicide					
	(1)	(2)	(3)	(4)	(5)	(6)
Unit max death rate	0.058**	0.008***	0.042***	0.006**	0.058***	0.004
	(0.026)	(0.002)	(0.008)	(0.002)	(0.008)	(0.002)
Days in war in 000	0.002***	0.002***	0.002***	0.003***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Controls	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes
Soldier type	volunteer	draftee	-	-	-	-
Share of volunteers in unit	-	-	high	low	-	-
Timing of entry	-	-	-	-	early	late
Constant	0.001***	0.001	0.001	0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	144 539	285 438	109 292	320 643	241 090	188 168

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *;

Table 3.5: Father's Suicide and GPA

	Dependent variable: GPA per school year						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father suicide	-0.192***	-0.183***	-0.112***	-0.179***	-0.210***	-0.134***	-0.127***
	(0.020)	(0.019)	(0.025)	(0.026)	(0.025)	(0.030)	(0.024)
Controls	-	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School type	all	all	elementary	high school	all	all	all
Father type	all	all	all	all	volunteer	draftee	all
Born after war	all	all	all	all	all	all	yes
Constant	3.773***	4.440***	4.469***	4.086***	4.408***	4.494***	4.570***
	(0.001)	(0.011)	(0.014)	(0.200)	(0.014)	(0.020)	(0.014)
Observations	165 731	165 731	98 028	67 703	114 778	50 953	110 925

Note:* Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by *; SE are clustered at unit level.

Table 3.6: Father's Suicide and School Absence

	Dependent variable: School Absence						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father suicide	20.216***	19.578***	13.420***	21.499***	17.136***	23.815***	14.234***
	(1.586)	(1.581)	(1.718)	(2.641)	(2.083)	(2.497)	(1.776)
Controls	-	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School type	all	all	elementary	high school	all	all	all
Father type	all	all	all	all	volunteer	draftee	all
Born after war	all	all	all	all	all	all	yes
Constant	58.003***	28.818***	30.884***	78.208***	29.944***	28.129***	24.987***
	(0.379)	(0.982)	(0.981)	(1.924)	(1.206)	(1.728)	(1.044)
Observations	164 085	164 085	95 253	68 832	113 546	50 539	108 969

Note: Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by ***; SE are clustered at unit level.

Table 3.7: Father's Suicide and School Behavior

	Dependent variable: School Behavior						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father suicide	-0.107***	-0.099***	-0.020	-0.126***	-0.098***	-0.104***	-0.023
	(0.014)	(0.014)	(0.013)	(0.025)	(0.019)	(0.022)	(0.015)
Controls	-	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
School type	all	all	elementary	high school	all	all	all
Father type	all	all	all	all	volunteer	draftee	all
Born after war	all	all	all	all	all	all	yes
Constant	2.842***	3.146***	3.120***	2.620***	3.128***	3.181***	3.153***
	(0.003)	(0.008)	(0.007)	(0.018)	(0.010)	(0.014)	(0.008)
Observations	160 136	160 136	92 305	67 831	111 424	48 712	105 307

Note: Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by ***; SE are clustered at unit level.

Table 3.8: Father's Suicide and High School State Exams

	Dependent variable: State Exam Grade						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father suicide	-0.134***	-0.158***	-0.128**	-0.334***	-0.127**	-0.276***	-0.022
	(0.044)	(0.045)	(0.049)	(0.094)	(0.056)	(0.076)	(0.112)
Controls	-	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes	yes	yes	yes
Course	all	all	mandatory	elective	all	all	all
Father type	all	all	all	all	volunteer	draftee	all
Born after war	all	all	all	all	all	all	yes
Constant	3.104***	2.647***	2.747***	2.329***	2.603***	2.735***	2.834***
	(0.012)	(0.030)	(0.034)	(0.059)	(0.036)	(0.057)	(0.176)
Observations	48 879	48 879	35 203	13 676	35 978	12 901	9 578

Note: Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by ***; SE are clustered at unit level.

Table 3.9: Types of Father's Death and Educational Outcomes

	Dependent variables:			
	GPA	Absence	Behaviour	State exams
Father suicide	-0.004	1.650	0.008	-0.130**
	(0.023)	(2.390)	(0.020)	(0.056)
Controls	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Unit FE	yes	yes	yes	yes
Constant	3.840***	75.477***	2.860***	2.820***
	(0.021)	(2.199)	(0.017)	(0.051)
Observations	8 302	8 356	8 020	2 273

Note: Significance at the 10% level is indicated by *, at the 5% level by **, and at the 1% level by ***; SE are clustered at unit level.