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Consequences of War

The intergenerational consequences of war: anxiety, depression, suicidality, and mental health among the children of war veterans

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Abstract

Background: The long-term effects of military deployment on the mental health of war veterans have been investigated extensively, but few studies have examined the long-term impact of parental deployment on children's mental health.

Methods: Using a retrospective, multigenerational survey and propensity score analysis to adjust for selection effects and endogeneity bias, we investigated the impact of parental deployment on the mental health of the adult children of Australian veterans of the Vietnam War. We analysed data from 1966 adult men (35%) and women (65%) whose fathers ($N = 1418$) were selected at random from the population of surviving men who served in the Australian army during the Vietnam War (1962–75). Mean age of respondents was 37. The main outcome measures were self-reported diagnosis or treatment for anxiety and depression (i.e. lifetime and previous 12 months), suicidality based on Psychiatric Symptom Frequency Scale, and current mental health as measured by the Mental Health Inventory of the SF-36. The key independent variable was whether their fathers were deployed to the Vietnam War.

Results: Almost 40 years after the war, the adult children of deployed veterans were more likely to have been diagnosed with anxiety [odds ratio (OR) = 1.54, confidence interval (CI) = 1.04, 2.28] and depression (OR = 1.77, CI = 1.03, 3.05), to have had thoughts of suicide and self-harm (OR = 2.39, CI = 1.57, 3.65) and to have made suicidal plans (OR = 3.52, CI = 1.40, 8.85) than the offspring of comparable, non-deployed army veterans. They also reported poorer current mental health (Coefficient = −5.08, CI = −6.60 – −3.56).

Conclusions: The results imply that there are significant and enduring adverse effects of parental deployment on the mental health of children in military families, and provide some insight into the potential long-term impacts of recent military engagements in Afghanistan and Iraq.

Key words: War, military service, deployment, intergenerational effects, mental health, military families

Key Messages

- We compared the adult children of Australian army veterans who were deployed to the Vietnam War (i.e. deployed veterans) with men and women whose fathers served in the Australian army in the same era, but who were not deployed to Vietnam (i.e. non-deployed Vietnam-era personnel).
- We controlled for pre-deployment differences between the deployed and non-deployed men using propensity score analysis and adjusted for the age, sex, marital status, educational attainment and employment status of their children.
- The adult children of the deployed veterans were more likely to have been diagnosed with anxiety and depression and more likely to have had thoughts of suicide and self-harm than the offspring of comparable, non-deployed ex-army personnel. Their self-reported current mental health was also poorer.
- These differences in mental health were apparent over the lifespan and in the recent past (i.e. the previous 12 months and the past 4 weeks). There are significant and enduring adverse effects of parental military deployment on the mental health of children.

Introduction

The effects of military deployment on the mental health of veterans have been investigated extensively, but relatively few studies have examined how it affects their children.[1–4] Young children of deployed parents experience more anxiety and depression than their peers and indicate greater psychological distress while their parents are deployed and in the months and years immediately following their return from service.[2,4–6] These problems could reflect the effects of child-parent separation, the adverse effects of deployment on parental relationships, or the results of significant psychological harms experienced by some veterans of war, including anxiety, depression, substance abuse and post-traumatic stress disorder (PTSD).[4–8] Although early experiences of internalizing problems often continue into adulthood,[9] few studies have investigated specifically the long-term intergenerational consequences of parental military service.[10] The few that have done so have been unable to rule out important rival explanations for their findings, including the selectivity of military service and deployment and the associated 'healthy veteran' and 'healthy warrior' effects that complicate research into the impact of military service.[11,12]

In this study, we investigate the long-term, intergenerational effects of military deployment by studying the mental health of the adult children of men who served in the Australian army during the Vietnam War. We compare the self-reported mental health of men and women whose fathers were deployed to the war in Vietnam with the children of comparable Vietnam-era personnel—men who also served in the Australian army during the same era, but who were not deployed to the war. In contrast to prior studies, our analyses adjust for the non-random deployment of military personnel using propensity score analyses based on an extensive list of individual and family characteristics. The results provide robust estimates of whether the adverse mental health consequences of modern warfare also extend to the families of those who serve, long after they return from war. Given the high proportion of parents among the two million and more military personnel deployed to recent wars in Afghanistan and Iraq,[13] our results also provide insights into the potential long-term ramifications of recent military engagements in the Middle East and Central Asia.

Methods

Design and participants

The Vietnam Veterans Family Study (VVFS) is a multigenerational, retrospective cross-sectional study of the physical, mental and social welfare of men who served in the Australian military during the Vietnam era (1962–75) and their families. It is designed to compare the families of male Australian army veterans of the Vietnam War with the families of men who also served in the army during the Vietnam War, but who were not deployed to Vietnam. The sample is limited to male army veterans because women comprised less than 0.1% of Australian army personnel deployed to the Vietnam War ($N = 43$), all of them within a single corps (i.e. the Royal Australian Army Nursing Corps). The design—comparing deployed and non-deployed ex-army men—limited the risk of biases resulting from comparisons of military personnel and members of the general population (e.g. the so-called 'Healthy Veterans Effects'). In principle, observed differences between the children of Veterans and the children of non-deployed Vietnam-era personnel may be used to estimate the impact

of service in the Vietnam War, provided that rival explanations for those differences can be excluded.

Study sample

A total of 7907 former army personnel were selected at random from lists of deployed male war veterans ($N = 3940$) and non-deployed, male ex-army personnel ($N = 3967$) administered by the Department of Veteran's Affairs (DVA) and the Department of Defence. Those contacted were invited to register for the study and to ask other family members, including their adult children, to also take part. Family members who registered were contacted and asked to complete hard-copy or online questionnaires, with follow-up reminders sent by mail or e-mail or made by telephone. In some cases, respondents were interviewed by telephone.

Of those sampled, 76% of deployed veterans and 64% of the non-deployed, Vietnam-era personnel completed the survey ($N = 3011$ and $N = 2530$, respectively); 27% of the 5175 ex-army respondents (first-generation respondents) with living children had at least one of their children register and participate in the study, and also provided complete data on items of interest ($N = 1418$). The deployed war veterans were more likely than the non-deployed men to recruit their children to the study: 34% of the deployed fathers ($N = 951$) and 20% of the non-deployed fathers ($N = 467$) had one or more of their offspring complete the survey. This resulted in a potential sample of 2056 children (second-generation respondents), 68% of whom were the offspring of deployed Vietnam Veterans ($N = 1405$) and 32% were from the families of non-deployed Vietnam-era personnel ($N = 651$).

To evaluate the representativeness of the sample, we matched the deployed veterans in our sample to the official register of deployed veterans of the Vietnam War from which respondents were sampled, known as the Nominal Roll. We then compared the deployed respondents with the rest of the population of deployed Vietnam Veterans ($N = 40\,051$). The deployed veterans in our sample are slightly younger than the rest of the population of deployed Vietnam Veterans (by less than 2 years), although much of that difference could be due to the fact that the names of deceased veterans have not been removed from the Nominal Roll. The major difference between our estimation sample and the nominal roll is that the former includes a larger proportion of conscripts (see Supplementary Table 4, available as Supplementary data at *IJE* online). Despite the over-representation of conscripts, the estimation sample and the rest of the population of deployed Vietnam Veterans were similar in most other respects. Study participants were deployed to Vietnam for roughly the same length of time as those on the nominal roll, and the proportions in each of the major Army corps were comparable. They were just as likely also to have served in combat roles and to have been exposed to combat-related harms (e.g. the casualty rates of their units did not differ). Overall, these patterns suggest that the estimation sample is broadly representative of the total population of men from the Australian army who were deployed to the Vietnam War.

To evaluate the impact of differential recruitment within families, we investigated whether the second-generation respondents were more likely to participate in the study if they or their siblings suffered from a mental health problem. The results of these analyses were based on reports provided by the ffirst-generation respondents ($N = 5175$). They indicate that the deployed and non-deployed men were not more likely to recruit children into the study if one or more of their children suffered from either anxiety or depression. Although the children of the deployed Vietnam Veterans were more likely to take part than the children from the families of the non-deployed Vietnam-era personnel, the difference in participation between the adult children of the deployed and non-deployed men was unaffected by whether those children or their siblings had mental health problems. Thus, we are confident that any mental health differences that we might observe between the children of the deployed and non-deployed men are not due to differences in their rates of recruitment.

Ethics

The research design was approved by three human research ethics committees: the Department of Veterans' Affairs Human Research Ethics Committee; the Australian Defence Human Research Ethics Committee; and the Australian Institute of Health and Welfare (AIHW) Human Research Ethics Committee.

Variables

We used as dependent variables four self-reported measures of mental health of the second-generation respondents. 'Anxiety' and 'depression' were binary indicators identifying respondents who reported having been diagnosed with or treated for anxiety and depression (Yes = 1, No = 0). 'Suicidality' was a self-reported ordinal measure derived from five dichotomous items from the Psychiatric Symptom Frequency Scale.[14] Respondents were asked whether they had ever: felt that life is hardly worth living; thought they would really be better off dead; thought about taking their own lives; made plans to take their own lives; or attempted suicide. We then classified them into three

levels to distinguish between those who: had not had any thoughts about suicide (i.e. no items); had suicidal thoughts (items 1–3); and had either planned or attempted suicide (items 4–5). For all three variables, we created measures of both lifetime and recent psychological distress to indicate whether respondents had experienced each symptom or problem at any point in their lives and in the 12 months preceding the survey. We also assessed 'current mental health' using the Mental Health Inventory from the Medical Outcomes Study 36-item Short-Form Health Survey (SF-36).[15] This is a 5-item measure of mental health in the 4 weeks preceding the survey that is scored between 0 and 100, with high scores indicating better mental health.

The key independent variable is whether the first-generation respondent was deployed to the Vietnam War (Yes = 1, No = 0), as indicated by DVA administrative records. The remaining independent and control variables relate to the social and demographic characteristics of their children (i.e. the second-generation respondents). These are: age in years; sex (Female = 1, Male = 0); education (School = 1, Certificate or Diploma = 2, University = 3); current employment (Employed full- or part-time = 1, Not Employed = 0); and marital status (Married or partnered = 1, Divorced or separated = 2, Single or never in a relationship = 3). Descriptive statistics for the dependent and independent variables are provided in Table 1.

Taking into account missing data, our estimation samples for the analyses of anxiety and depression, suicidality and current mental health consisted of, 1966, 1962, 1346 and 1959 children, respectively. These comprised all second-generation respondents who provided complete information on all independent variables and on measures of both lifetime and recent psychological distress. In most cases, patterns of missing data among the children were unaffected by the deployment status of their fathers, although the offspring of the deployed veterans were slightly less likely to answer questions about recent suicidal plans or actions. We replicated the analyses of lifetime suicidality on the larger sample of respondents who answered those questions ($N = 1963$) and for which the proportion of children from the families of the deployed Vietnam Veterans was the same as it was in the other estimation samples. The results of those analyses were consistent with the findings reported below.

Table 1. Descriptive statistics of the adult children of ex-army personnel

	Children of non-deployed personnel ($N = 628$)	Children of deployed personnel ($N = 1338$)
Age	37.58 (36.75, 38.41)	37.20 (36.63, 37.76)
Female	0.65 (0.60, 0.70)	0.64 (0.61, 0.68)
Education		
School or below	0.23 (0.18, 0.29)	0.23 (0.21, 0.26)
Certificate/diploma	0.28 (0.23, 0.33)	0.35 (0.31, 0.39)
University or above	0.49 (0.44, 0.54)	0.41 (0.38, 0.45)
Employment		
Unemployed	0.20 (0.16, 0.24)	0.18 (0.15, 0.20)
Employed	0.80 (0.76, 0.84)	0.82 (0.80, 0.85)
Marital status		
Married/partnered	0.74 (0.69, 0.79)	0.76 (0.73, 0.79)
Divorced/separated	0.20 (0.16, 0.25)	0.16 (0.14, 0.19)
Single/never been in relationship	0.06 (0.04, 0.08)	0.07 (0.06, 0.09)

Table reports means with 95% confidence intervals in brackets.

Statistical analysis

We used propensity score analysis to adjust for differences in the probability of deployment among the ex-army personnel. This method is intended to help overcome the selection biases commonly encountered in observational research, by estimating and taking into account the conditional probability of experiencing an event (e.g. deployment).[16,17] Specifically, we used logistic regression analyses to estimate the probability of deployment among the first-generation respondents as a function of 40 different measures of their pre-deployment characteristics, including their military service, educational achievement, school experiences, previous employment, early family characteristics and experiences, pre-existing medical conditions before deployment and family history of health problems (see Supplementary materials, available as Supplementary data at *IJE* online). We then used the estimated probabilities to create propensity score weights for each respondent equal to the inverse probability of deployment for the deployed veterans and the inverse probability of non-deployment for the non-deployed Vietnam-era personnel. With weighting, the deployed and non-deployed men did not differ on most pre-deployment characteristics (see Supplementary materials, available as Supplementary data at *IJE* online).

We then estimated the impact of parental military service on the mental health of the second-generation respondents using logistic (in the case of the two binary outcomes), multinominal (in the case of the outcome with

multiple categories), and linear (in the case of the continuous outcome) regression models. For each of the four outcomes—depression, anxiety, suicidality and current mental health—we estimated two models. We began by estimating the relationship between deployment and the indicators of psychological distress and mental health, adjusting only for age and sex. We then re-estimated those relationships after controlling for additional characteristics of the second-generation respondents (e.g. marital status, educational attainment and employment status). In each instance, cases were weighted using the propensity score weights before analysis. The analyses also adjusted for sample clustering with robust standard errors (using the survey data estimation commands in Stata 15) because fathers recruited children into the study and because some fathers had more than one child participate in the study. For the logistic regressions, results are presented as odds ratios, whereas for the linear regressions we report coefficient estimates.

Results

Table 2 reports the results of the logistic and multinomial regression analyses of depression, anxiety and suicidality among the adult children of the deployed and non-deployed men, adjusting for age and sex (Model 1) and for age, sex, education, employment and marital status (Model 2). These models describe the likely impact of parental deployment on self-reported psychological distress over the lifetime and over the past 12 months, adjusting for the probability of paternal deployment using propensity score weights.

The results show clearly that the sons and daughters of the deployed veterans had higher lifetime rates of psychological distress than the offspring of the non-deployed Vietnam-era personnel. Men and women whose fathers were war veterans were more likely to have been diagnosed or treated for depression [odds ratio (OR) = 1.58] and anxiety (OR = 1.71) than their counterparts. Compared with the families of the non-deployed Vietnam-era personnel, the offspring of the deployed men were also more likely to have thought about killing themselves (OR = 2.06) and more likely to have taken some action to that effect (OR = 2.60).

The estimates in Model 2 were virtually identical to those in Model 1, suggesting that the association between psychological distress in adulthood and paternal military deployment is independent of other factors such as age, sex, education, employment or marital status. For men and women whose fathers served in the war, the odds of ever having been diagnosed with or treated for depression or anxiety were 59% and 72% greater, respectively, than the odds for those whose military fathers avoided active service in the Vietnam War. Differences in the odds of suicidality were even greater. The odds that the children of the deployed men had thought about suicide and planned or attempted it were 132% and 197% higher, respectively, than the odds of their counterparts doing the same.

Table 2 also reports the odds ratios of recent psychological distress for the children of deployed and

Table 2. Estimated impact of deployment of fathers on adult children's lifetime and recent mental health

	Lifetime		Past 12 months	
	Model 1	Model 2	Model 3	Model 4
Depression	1.58	1.59	1.52	1.54
	(1.17, 2.14)	(1.18, 2.14)	(1.04, 2.23)	(1.04, 2.28)
	0.003	*0.003*	*0.031*	*0.030*
Anxiety	1.71	1.72	1.79	1.77
	(1.23, 2.40)	(1.23, 2.40)	(1.07, 3.02)	(1.03, 3.05)
	0.001	*0.001*	*0.028*	*0.039*
Suicidality				
No suicidal thoughts	—	—	—	—
Suicidal thoughts			2.13	2.39
	2.06 (1.31, 3.23)	2.32 (1.45, 3.71)	(1.42, 3.19)	(1.57, 3.65)
	0.002	*0.000*	*0.000*	*0.000*
Plans and/or attempts	2.60	2.97	3.09	3.52
	(1.44, 4.70)	(1.66, 5.33)	(1.20, 8.00)	(1.40, 8.85)
	0.002	*0.000*	*0.020*	*0.008*

Table reports odds ratios, with 95% confidence intervals in brackets (based on robust standard errors), and *P*-values in italics. Models 1 and 3 adjusted for adult children's sex and age, whereas Models 2 and 4 adjusted for their sex, age, education, employment and marital status. Estimation sample sizes are 1966, 1962 and 1346 for depression, anxiety and suicidality, respectively.

Table 3. Estimated impact of deployment of fathers on adult children's current mental health

	Past 4 weeks	
	Model 5	Model 6
Mental health	−5.01 (−6.62, −3.41) *0.001*	−5.08 (−6.60, −3.56) *0.001*

Note: Table reports linear regression coefficients, with 95% confidence intervals in brackets (based on robust standard errors), and *P*-values in italics. Model 5 adjusted for the sex and age of the adult children, whereas Model 6 adjusted for their sex, age, education, employment and marital status. The estimation sample size is 1959.

non-deployed men, as indicated by treatment for depression and anxiety and self-reported suicidality in the previous 12 months. These results also adjust for age and sex (Model 3) and age, sex, education, employment and marital status (Model 4) and are estimated using propensity score weights. They indicate that sons and daughters of the deployed war veterans were more likely to have been diagnosed or treated for depression (OR = 1.52) and anxiety (OR = 1.79) in the preceding year. They were also more likely to have had recent thoughts about suicide (OR = 2.13) and to have engaged in some kind of planning or suicidal action (OR = 3.09). After adjusting for age, sex, education, employment, and marital status, the odds of having been treated for or diagnosed with depression and anxiety were 54% and 77% higher, respectively, among the children of the deployed men than the odds for those whose fathers had not been deployed to the Vietnam War. Relative to not having thought about suicide, the odds that they had thought about suicide in the previous 12 months were 139% higher than among the children of the Vietnam-era personnel. Although the estimated odds ratio is less precise, the odds of them having made suicidal plans or engaged in self-harm in the preceding year were 252% higher than among those of their counterparts.

Finally, Table 3 reports results of the linear regression analyses of current mental health in the 4 weeks preceding the survey. Adjusting for age and sex (Model 5), the offspring of the deployed veterans reported worse levels of mental health than the adult children of the men who did not deploy to the Vietnam War [coefficient (B) = −5.01]. After also controlling for marital status (Model 6), educational attainment, and employment, the estimated effect of deployment on current mental health hardly changed. The children of the deployed veterans had mental health scores that were lower than those of the adult children of the non-deployed Vietnam-era personnel (B = −5.08)—roughly 41% of one standard deviation lower.

Discussion

The main finding of this study is that the adult children of Australian men who were deployed to and served in the Vietnam War have worse mental health than the children of comparable men who served in the Australian army in the same era, but were not deployed to the war in Indochina. Specifically, they were more likely to have been diagnosed or treated for anxiety and depression, more likely to have thought about suicide and more likely to have made plans or taken some action to end their lives. They also reported worse levels of mental health in the immediate past.

These results extend previous research in two ways. First, our study is one of only a handful of studies to have investigated the long-term intergenerational consequences of wartime military service.[9,10] Whereas a number of studies have concentrated on young children and adolescents in the immediate aftermath of parental military service in recent conflicts,[18–20] our study focused on adults whose parents returned from war 30–40 years previously and who were typically in their late 30 s at the time they were surveyed. We also examined their recent and lifetime experiences of mental health problems, including their current mental health in the preceding weeks. Second, we sought to control for several sources of selection bias, including the 'healthy soldier' and 'healthy warrior' effects,[11,12] which can complicate estimates of the impact of wartime military service. In particular, we used propensity score analysis to compare the adult offspring of men who served in the Vietnam War with those of comparable non-deployed military personnel—men with similar educational, employment, family and military backgrounds and with comparable family medical histories. Although our study is not the first to compare deployed and non-deployed military personnel to evaluate the long-term impacts of military service,[21] it is the first to systematically adjust for pre-deployment differences between those groups when assessing the intergenerational effects of wartime military service.

Given these advances, the higher rates of anxiety, depression and suicidality and the lower rates of mental health observed among the adult children of the men who served in the Vietnam War cannot be dismissed easily as the result of factors that preceded their entry into the military or their deployment to the war in Vietnam. The results of this study are not due to pre-deployment differences between the deployed and non-deployed fathers, in terms of their educational experiences, employment histories, family backgrounds, relationships with parents or health before entering the military. Nor are they due to key social and demographic characteristics of their children, such as

age, sex, education, employment or marital status. The most plausible explanation for the results, therefore, is that the higher rates of mental health problems found among the sons and daughters of Vietnam veterans are among the intergenerational effects of military service in the Vietnam War. Our study shows that those effects continue to affect military families even decades after the end of the war.

Sending soldiers to war might affect the long-term life outcomes of their children in a variety of ways. One possibility is that separation from parents causes children significant psychological distress, especially if the pains of separation are compounded by concerns for the safety of their deployed parents. Prior studies indicate that children whose parents go to war experience more anxiety and depression than others and higher levels of psychological distress, during and immediately following deployments.[2,4,5,6] At the same time, deployment can increase strain on parents left behind to care for children, which could account for much of the apparent impact of deployment on children.[4,22,23] Given that one-third of the children from the families of Vietnam Veterans were born before the end of Australia's involvement in the war, their higher rates of mental distress could be due, at least in part, to problems associated with their early separation from their fathers or the temporary separation of their parents while their fathers were deployed to the war in Vietnam.

Many war veterans also experience a range of psychological harms, including post-traumatic stress disorder (PTSD).[24,25] Several studies find significant mental health problems among the children of parents suffering from PTSD or exposed to trauma.[26–28] PTSD has the potential to seriously affect child development in a variety of ways because of its long-term effects on parental behaviour.[8] Sufferers are often withdrawn and can seem cold and distant to family members, which may undermine child-parent attachment, or they may become more prone to violence[8,26] or harsh and erratic parenting styles;[8,26,29,30] 39% of the deployed Vietnam Veterans in the VVFS had symptoms consistent with PTSD compared with less than 5% of the non-deployed Vietnam-era personnel. Many more may have suffered from subthreshold levels of PTSD or from comorbid psychological conditions that are also likely to affect children, including anxiety, depression or substance abuse.[31]

Finally, at least some of the impact of deployment on children's mental health could be due to its effects on the relationships between deployed personnel and their partners. Previous studies report that deployment can impair relationship functioning, increase relationship conflict and increase the risk of divorce—especially if veterans experience PTSD.[7,32] In turn, in some cases, relationship dissolution, or high levels of conflict between parents, can have lasting effects on children.[32]

Like any study, this one has some limitations. First, our study is based on a survey of surviving veterans; hence, we are unable to estimate the intergenerational consequences of war service among the families of deployed veterans who were killed in action or who died since the war ended. Second, our propensity score analysis can adjust only for factors that were observed and measured in the survey. Although our analysis adjusts for possible differences between the deployed and non-deployed men across an extensive number of factors, we were unable to control for unobserved differences between the deployed veterans and their non-deployed Vietnam-era counterparts. Third, our analyses are reliant on self-reported measures of mental health. Although two of our four dependent variables are based on validated self-report measures—the Psychiatric Symptom Frequency Scale and the Mental Health Inventory of the SF-36—we acknowledge that clinical assessment schedules may have provided more accurate assessment of the extent of mental distress among respondents and should be included in future studies. Nonetheless, the consistency with which we have observed the intergenerational impact of deployment across four different measures of mental health should provide some confidence in the robustness of our findings.

Finally, we have not evaluated empirically the causal mechanisms that might explain the effects of military deployment on children. Instead, our primary objective has been to assess whether there are long-term intergenerational consequences of military service, including whether those effects endure after adjusting for the selectivity of deployment. As such, although our propensity score analyses include an extensive list of pre-deployment factors, we have avoided including potential post-deployment endogenous factors, such as whether the deployed men had experienced PTSD, depression, anxiety, alcoholism or divorce, as doing so without first demonstrating that there are meaningful differences in mental health between the children of the deployed and non-deployed men would likely have led us to underestimate the intergenerational effects of military service.

These caveats aside, the current study provides a unique assessment of the long-term impact of deployment on the children of war veterans. Based on a large and representative sample of military personnel, combining information from both the ex-army personnel and their children, and controlling for the selectivity of deployment, it suggests that counting the costs of military engagements requires an account of their intergenerational consequences. It may be impossible to ever fully measure the human costs of war, either within a single generation or across several; but estimating the social and economic costs generated by increased rates of anxiety, depression, suicidality and poor mental health among the children of military personnel,

will provide a more realistic assessment of the price our communities pay for the wars we wage.

Supplementary Data

Supplementary data are available at *IJE* online.

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